Appendix B

Description and Photo-Documentation of Field Work Activities 2005-2007

***Jeremy Hanlon*[1]**
***Justin Graham*[1]**
***William Stringfellow*[1]**
***Jesse Merkel*[1]**
***Remie Burks*[1]**
***Chelsea Spier*[1]**
***Sharon Borglin*[1]**
***Kennedy Nguyen*[1]**
***Gary Litton*[2]**
***Chris Linneman*[3]**
***Liz Vonckx*[4]**
***Kyle Kearney*[4]**
***Lara Sparks*[5]**
***Mat Rogers*[6]**
***Nigel Quinn*[6]**

February 2008

[1]Environmental Engineering Research Program
[2]School of Engineering & Computer Sciences
University of the Pacific
3601 Pacific Avenue, Sears Hall
Stockton, CA 95211

[3]Summers Engineering, Hanford, CA

[4]Tetra Tech, Lafayette, CA

[5]Grasslands Water District, CA Department of Fish and Game, Los Banos, CA

[6]Lawrence Berkeley National Laboratory, Berkeley, CA

Introduction

The Environmental Engineering Research Program (EERP) at the University of the Pacific (UOP) is the lead scientific agency on several water quality and ecosystem restoration projects focused on understanding and improving water quality in the San Joaquin River (SJR). EERP projects include the development of a mass balance on phytoplankton and oxygen demanding materials in the SJR, evaluation of organic carbon sources and fate in the SJR, studies of wetland ecosystems, and studies examining the impact of current agricultural best management practices (BMPs) on water quality. For all of these projects, water quality and water flow must be measured at numerous locations throughout the watershed.

EERP works in cooperation with local, State, and Federal scientists and stakeholders to maintain a network of flow and water quality monitoring stations throughout its study region. The field research program effort includes water quality sampling (grab sampling), flow measurement, continuous flow monitoring station maintenance, quality assurance (QA), and flow rating events, as well as activities associated with directed scientific studies, such as deployment of continuous chlorophyll monitors to measure temporal variation in phytoplankton growth kinetics. Major objectives of the field research program are to support stakeholder flow monitoring efforts, maintain a high level of quality control on all flow and water quality monitoring activities, organize collected data for scientific and engineering analysis, and collect data in support of modeling efforts. The purpose of this report is to document EERP field activities for the 2005-2007 field seasons.

Methods

Field notebooks were used to document all field activities. The field activity summaries document field activities by day for 2005-2007. Each field activity summary includes a brief description of the objectives and the work performed. Each day was categorized with appropriate heading. Available photographs were included to provide further documentation. Any problems encountered in the field were documented in the field notebook and activity report. Each field day is categorized using headings of sampling, station maintenance and QA, extended deployment, or station upgrades, where applicable.

Equipment used in EERP field work is listed in Table 1. In 2005-2007, sampling events were categorized into Core sampling, Intermittent sampling, Wetland sampling, BMP sampling, and Extended Deployment sampling. The designations correspond to specific sampling lists and schedules developed to assist EERP field teams in organizing their activities. Core sampling events included up to 25 sampling sites. Wetland sampling events included up to 20 sites. BMP sampling included up to 17 sites. The number of sites sampled on Extended Deployment sampling events and Intermittent sampling events varied to accommodate specific scientific objectives. A comprehensive site list is provided in Table 2.

Sampling and Water Quality Measurements

At each location for each sampling event, water quality data was collected using an YSI 6600 multi-parameter sonde connected to an YSI 650 MDS handset (YSI Inc., Yellow Springs, CO). The sonde was deployed and programmed to log a reading for every parameter every four seconds for at least two minutes, providing a statistically significant sample size ($n > 30$)

(Graham and Hanlon, 2008). The parameters measured by the sonde at each site included time, temperature (°C), electrical conductivity (mS/cm), total dissolved solids (g/L), dissolved oxygen (DO) percent, DO concentration (mg/L), DO charge, depth (ft), pH, oxidation-reduction potential (mV), turbidity (NTU), chlorophyll content (ug/L), fluorescence, and barometric pressure (mmHg).

While the sonde logged water quality data, water samples were collected and incident sunlight and water-velocity were measured (to document current field conditions) (Graham and Hanlon, 2008; Puckett, 2002). Water samples were collected in three different types of bottles: glass 1 liter bottles (Wheaton Science Products, Millville, NJ), 1 liter Trace-Clean plastic bottles (VWR International, West Chester, PA), and 250 mL Trace-Clean plastic bottles (VWR International)] in accordance with requirements for different lab analyses (Borglin et al., 2008). Samples were depth integrated and stored at 4°C after sampling. Light measurements were taken using a handheld LUX meter (Control Company, Friendswood, TX). Velocity measurements were taken with a model 2000 flow-meter (Marsh-McBirney, Frederick, MD) (Graham and Hanlon, 2008).

Station Maintenance and QA

Station maintenance included downloading data from the station logger, cleaning the EC probe, checking the bubbler line for leaks, clearing weir and instruments of debris, and inspecting equipment for damage. Oftentimes QA was performed at the same time as station maintenance. QA was performed on EC and flow.

For QA on the EC probe, the probe was cleaned with a small brush and the probe EC values were compared to an independently calibrated YSI sonde placed into the water adjacent to the other probe. If the EC probe showed more than 10% difference from the calibrated reference sensor, the probe was re-cleaned and basic maintenance performed, such as checking connections. If the probe continued to give low quality data, typically the only repair was to replace the faulty probe.

A QA value (rating measurement) for flow depended on the site being visited. If the site had a sharp crested weir structure, a weir stick (Cal Poly ITRC, San Luis Obispo, CA) measured flow and the flow measurement was entered into the QA and rating record. When the site did not have a sharp-crested weir, a cross-channel flow rating was taken by wading, using a handheld flow meter and measuring tape strung across the channel. Average water velocity was then taken at 60 percent depth from the bottom at set intervals across the stream channel, usually every foot but varied depending on the channel width. Flow was calculated by multiplying cross-sectional area of each section by the velocity for that section and adding sectional flows to obtain a total flow, or discharge, for the site. At all sites the staff gauge was recorded as the QA value and compared with in-situ stage measuring equipment. Discrepancies between manual ratings and continuous measurement were resolved by any number of means, up to and including replacing or moving the location of monitoring stations.

Extended Deployment

Extended deploy field events included taking sondes and leaving them at specific sites for an extended period of time, usually lasting two weeks (Graham and Hanlon, 2008). Extended deploy events were often in conjunction with a sampling event. Grab samples provided starting and ending water quality samples to compare with the extended deployment sonde values.

Sondes were calibrated the day before being placed in the field and modified with longer wiper brushes to better keep the sensors free of algae and debris. They were programmed to run unattended for the length of deployment. At the time of deployment, sondes were put into black PVC housings protecting the equipment from damage while at the site. Sondes were attached with a cable and padlock to an anchor, such as a metal post or bridge pylon. Once deployed, sondes were left unattended for periods of approximately two weeks. Upon conclusion of the deployment sondes were retrieved and placed into coolers to keep the membranes moist until post-calibration could be performed. Post-calibration was completed within twenty-four hours of deployment. After being post-calibrated sondes were cleaned with water, the DO membranes and batteries were changed, and the extended deploy wipers were removed (Graham and Hanlon, 2008).

Dye Studies

Dye study field events involved injecting Rhodamine dye into the site water and then using sondes to track the progress of the dye to measure flow within the target sampling area. Dye studies were performed on the San Joaquin River and the San Luis Drain. The dye study on the San Joaquin River involved the use of a boat floating with the current to measure the progress of the dye. On the San Luis Drain dye was injected and sondes were placed at specific points downstream to measure the progress of the dye. Flow could then be determined from the distance between sites and the time interval between detection of the dye.

Station Up-Grades

Activities performed during flow station upgrades depended on what was being done to the specific site. Upgrades often consisted of installing new equipment. A list of equipment used for flow measurement is listed in Table 1. Frequently upgraded equipment included bubbler units, Doppler flow meters, EC probes, and weir boards. A list of equipment for each upgrade was compiled and measurements were made for any equipment lines, weir boards or other materials that needed to be added to the station. Materials and supplies were purchased and brought back to UOP allowing easier access to a wider range of tools that could not be brought out to the field. Work was completed at UOP and the materials were brought to the site often needing to be cut or bent. The equipment was installed and lines were run from the station house to the equipment.

Results

During 2005-2007 crews went into the field a total of 201 times. Of these 201 trips, 128 were sampling events, 37 were flow ratings, 2 were dye studies, and the other 32 times consisted of station upgrades, training sessions, meetings, field reconnaissance, and station maintenance. Core sites were sampled 58 times, Wetland sites 27 times, Intermittent sites 12 times, Extended Deploy sites 18 times, BMP sites 9 times, San Luis Drain sites 3 times during San Luis Drain studies, San Luis Drain Shutoff sites 8 times, and San Luis Drain TOC sites 1 time. Grasslands monitoring and QA was performed 8 times and Westside monitoring and QA was performed 28 times.

During the 2005 field season crews went into the field a total of 47 times. Of these 47 trips, 30 were sampling events, 8 were flow ratings and station maintenance, 2 were San Luis Drain sampling events, 2 were dye studies, the other 5 times consisted of field reconnaissance, meetings, and training sessions. Core sites were sampled 18 times, Wetland sites 7 times, Intermittent sites 4 times, San Luis Drain TOC sites 1 time, and the San Luis Drain was sampled 1 time during the San Luis Drain study. Grasslands monitoring and QA was performed 1 time, Wetlands monitoring and QA was performed 1 time and Westside monitoring and QA was performed 6 times. A dye study was conducted 1 time on the San Joaquin River and 1 time on the San Luis Drain. On May 23rd through May 27th Jeremy Hanlon, Jesse Merkel, and William Stringfellow attended a confined space training session with the Stockton Fire Department at the Port of Stockton.

During the 2006 field season crews went into the field a total of 80 times. Of these 80 trips, 43 were sampling events, 16 were flow ratings, and the other 21 times consisted of station upgrades, training sessions, meetings, and station maintenance. Core sites were sampled 21 times, Wetland sites 12 times, Extended Deploy sites 4 times, BMP sites 3 times, Intermittent sites 2 times, and the San Luis Drain was sampled 1 time during the San Luis Drain study. Grasslands monitoring and QA was performed 6 times and Westside monitoring and QA was performed 10 times.

During the 2007 field season crews went into the field a total of 74 times. Of these 74 trips, 55 were sampling events, 13 were flow ratings, and the other 6 times consisted of station upgrades, field reconnaissance, meetings, and station maintenance. Core sites were sampled 19 times, Wetland sites 8 times, Extended Deploy sites 14 times, BMP sites 6 times, Intermittent sites 6 times, San Luis Drain Shutoff sites 8 times, and the San Luis Drain was sampled 1 time during the San Luis Drain study. Grasslands monitoring and QA was performed 1 time and Westside monitoring and QA was performed 12 times.

Occasionally equipment failures were discovered during station maintenance events. Most equipment failures were fixed in the field, other times equipment had to be switched out and taken back to the Hydraulics Lab at UOP to be fixed. On February 3rd, 2005 the EC probe and cable were replaced at DO-68 S-Lake Basin and Fremont Drain next to DO-46 Mud Slough at Gun Club Road. The Starflow at DO-35 Westley Wasteway was removed on May 17th, 2005 and brought back to UOP to troubleshoot. It was reinstalled on August 2nd, 2005. The swage fitting on the bubbler line at DO-33 Hospital Creek was found to be leaking on May 17th, 2005 and was fixed by removing and reassembling the fitting. On the same day the EC cable was replaced at DO-53 Salt Slough at Wolfsen. The Starflow unit at DO-31 New Jerusalem Drain was removed to troubleshoot back at UOP on September 6th, 2005 and

reinstalled on October 5th, 2005. On September 29th, 2005 the Starflow at DO-35 Westley Wasteway was ripped out and had to be reinstalled. A new Starflow unit was installed at DO-62 Mallard Slough on October 11th, 2005. The bubbler line pipe at DO-64 Moran Drain was loose and anchors were put into the concrete on October 11th, 2005 to support the pipe. On January 9th, 2006 the pressure transducer at DO-68 S-Lake Basin was non-functional. The cable for the pressure transducer was measured for a replacement sensor to be installed. January 31st, 2006 DO-31 New Jerusalem Drain had a leaky bubbler line that was fixed by having the line removed and connections retightened. DO-35 Westley Wasteway Flow Station had a short circuit with the Starflow, due to a damaged cable, that made the logger freeze. The logger was removed on February 8th, 2006 and reinstalled on February 14th, 2006 and the Starflow cable was disconnected from the logger. On May 9th, 2006 DO-38 Marshall Drain Road had a leaky bubbler that was fixed by removing the "T" valve. The Design Analysis (Logan, Utah) logger unit at DO-31 New Jerusalem Drain was reporting errors when downloading data on November 17th, 2006 and December 8th, 2006. The logger was replaced on December 18th, 2006. On May 22nd, 2007 the steel cables attached to the EC sensors at the Westside Stations were found to be corroded and were replaced on July 10th, 2007. On September 11th, 2007 the bubbler unit at DO-36 Del Puerto Creek was found with an unusually high tank pressure. The bubbler unit was switched out and brought back to the Hydraulics Lab at UOP on October 9th, 2007 to troubleshoot. The unit was found to be functional and a clog in the line was discovered and cleared out on November 1st, 2007. On September 9th, 2007 the weir structures at DO-38 Marshall Road Drain and DO-65 Spanish Grant Drain were found to be full of sediment. The drains were cleared out in January of 2008. The station at DO-57 Ramona Lake was repaired on March 20th, 2007 and 29th, 2007 after being washed out in the April 2006 floods. Sediment was cleared from behind the weir boards at DO-35 Westley Wasteway on August 14th, 2007 and from DO-34 Ingram Creek on November 1st, 2007. On November 15th, 2007 the EERP boat started to have problems with its engine performance. The jet drive on the boat was clogged with a few small twigs that prevented it from performing correctly. Jeremy Hanlon disassembled the jet drive on the boat and cleared out the twigs returning the boat to its full performance.

Sometimes natural events, such as storms, washed out a station. On January 9th, 2006 the sensors and bridge at DO-20 Los Banos Creek Flow Station were found washed out. The bridge was replaced by Grasslands Water District in March 2006 and the bubbler installed September 5th, 2006 and the Sontek installed October 31st, 2006. On Feb 2nd, 2006 DO-45 Volta Wasteway at Ingomar Grade the staff gauge was remounted on a metal pole because the first (wood) fixture had rotted out. The station at DO-57 Ramona Lake was washed out in the 2006 April floods and was repaired in March 2007. Occasionally there were problems with the wiper that cleans the optic sensors on the sonde used for sampling and extended deployments causing the wiper to park over the sensor and present invalid readings. This happened on September 7th, 2006 to one of the crews on a Core sampling event. On October 26th, 2006 the sonde used for sampling had the DO sensor membrane punctured and had to be replaced in the field.

Discussion

All fieldwork activities for 2005-2007 were documented. On average there was a crew in the field 1.3 times each week. There were 3.6 sampling trips on average each month. Core sites were sampled an average of 1.6 times a month. Field activities were documented with photographs. However, a picture was not taken on every field event. Photographs were taken on each field outing from 2007. In 2005 on average there was a crew in the field 0.9 times each week and there were 2.5 sampling trips each month. Core sites were sampled an average of 1.5 times a month. In 2006 there was a crew in the field 1.5 times each week and 3.5 sampling trips each month. Core sites were sampled an average of 1.75 times a month. During 2007 there was a crew in the field 1.4 times each week and there were 4.6 sampling trips each month. Core sites were sampled an average of 1.6 times a month during 2007.

The majority of continuous monitoring stations worked without major problems. Stations that were reliable in 2005 were reliable in 2006 and 2007 with the exception of DO-20 Los Banos Creek and DO-57 Ramona Lake which were washed out by spring floods in 2006 and not repaired until late 2006 and early 2007, and DO-36 Del Puerto Creek which had a clog in the bubbler line for the last half of 2007. DO-35 Westley Wasteway Flow Station was not reliable in 2005 (in part due to illegal dumping activities blocking structures) and this station was relocated and completely remodeled and upgraded in 2006. There were a number of Starflow related problems in 2005 and a few units had to be removed and brought to UOP to troubleshoot. The QA stage at DO-38 Marshall Road Drain and DO-65 Spanish Grant Drain was not reliable from September 9th, 2007 until the end of the year because of the sediment buildup in the bottom of the weir structure. Occasionally leaks were found in the bubbler lines, but these were due to loose connections that were easily fixed.

Major equipment failures, such as the Starflow short circuit from DO-35 Westley Wasteway, were nearly all caused by outside factors. The short circuit in the Starflow was the result of a backhoe accidentally slicing the cable while clearing debris from the channel. At the end of 2006, when data for December was downloaded from Westside monitoring stations, a faulty data collection card failed to retrieve data from loggers at the same time caused the loggers to stop recording data for the rest of December. This error was not discovered until January 2007.

Reliability of flow data depended on the site in question. Any station that had consistency in structure, such as a weir system that is routinely cleared of debris, provided reliable flow and water quality data. Sites that had a bubbler line installed and a developed flow stage relationship supplied high quality flow data. However, if the weir was not kept clear of debris then the flow data was not reliable. DO-35 Westley Wasteway did not provide reliable data for 2005. The station was upgraded in 2006. Sites located in wetlands, such as DO-61 Deadmans Slough and DO-62 Mallard Slough, were subject to significant beaver activity and consistently had large amounts of debris (beaver dams) in front of the weir structures. This caused the water to back up behind the weir and gave low quality flow readings. Theses sites are being evaluated for up-grading to the use of Doppler flow meters that could be put at the outlet of the pipes and do not require a sharp-crested weir for high quality flow measurements and should be able to provide high quality flow measurements even in the presence of beaver activity.

References

Borglin, S., Burks, R., Hanlon, J., Spier, C., Graham, J., Stringfellow, W., 2008. EERP Standard Laboratory Operating Procedures. Environmental Engineering Research Program, Stockton, CA.

Graham, J., Hanlon, J., 2008. EERP Field Standard Operating Procedures Protocol Book. Environmental Engineering Research Program, Stockton, CA.

Pucket, M. 2002. Quality Assurance Management Plan for the State of California's Surface Water Ambient Monitoring Program ("SWAMP"). California Department of Fish and Game, Monterey, CA. Prepared for the State Water Resources Control Board, Sacramento, CA. 145 pages plus Appendices.

Table 1: Equipment Descriptions

Device	*Description*
Campbell Logger (Campbell Scientific Inc., Logan, UT)	Logger put into continuous monitoring stations. Records and stores data from EC probe, flow device, and bubbler.
H-350XL Design Analysis Logger (Design Analysis Associates Inc., Logan, UT)	Logger put into continuous monitoring stations. Records and stores data from EC probe, flow device, and bubbler.
MACE Agriflo (MACE, Sydney, Australia)	Doppler device put near bottom of channel to measure flow. This device is better for defined structures such as pipes and weir structures. Often used at monitoring stations.
Starflow (Unidata, O'Connor, Australia)	Doppler device put near bottom of channel to measure flow. This device is better for defined structures such as pipes and weir structures. Often used at monitoring stations.
Sontek (Sontek/YSI Inc., San Diego, CA)	Doppler device put in channel to measure flow. MACE units measure flow by looking out into the channel and are better for open, or natural, channel situations. Often used at monitoring stations.
H-350XL/355 Combo Bubbler (Design Analysis Associates Inc., Logan, UT)	A bubbler measures water level by detecting the pressure required to force air through a tube below the water level in the channel. In areas with a weir system a bubbler can be used to measure flow, as the height of water above the weir is proportional to the flow.
Staff Gauge (Wildlife Supply Company, Buffalo, NY)	A gauge put in a fixed location to observe water level. Often used to verify bubbler reading during QA visits.
Cal Poly ITRC Weir Stick (Cal Poly ITRC, San Luis Obispo, CA)	Scale mounted on a stick used to measure the height of the water above a weir structure. This value is then multiplied times the weir width to get flow.
EC Probe (YSI Inc., Yellow Springs, OH) (Campbell Scientific Inc., Logan, UT)	Sensor used to measure the Electrical Conductivity or Specific Conductivity of the water. Often deployed at monitoring stations in the field
YSI Sonde (YSI Inc., Yellow Springs, OH)	Multi-parameter instrument used to measure water quality. Most often used during sampling events and continuous monitoring.
Lux light meter (VWR International, West Chester, PA)	Meter used to measure light intensity.
GPS Map 188C Sounder with sonar (Garmin Intl. Inc., Olathe KS)	Global Positioning System. Used to track location when using the boat and to map out sample sites.

Table 2: EERP Site List

DO Number	*Site Name*	*Type*
1	**SJR at Channel Point**	Intermittent
2	**SJR at Dos Reis Park (Lathrop)**	Intermittent
3	**SJR at Old River**	Intermittent
4	**SJR at Mossdale**	Core sites
5	**SJR at Vernalis-McCune Station (River Club)**	Core sites, BMP
6	**SJR at Maze**	Core sites, BMP
7	**SJR at Patterson**	Core sites, BMP
8	**SJR at Crows Landing**	Core sites, BMP
9	**SJR at Fremont Ford**	Intermittent
10	**SJR at Lander Avenue**	Core sites
11	**French Camp Slough**	Intermittent
12	**Stanislaus River at Caswell Park**	Core sites
13	**Stanislaus River at Ripon**	Intermittent
14	**Tuolumne River at Shiloh Bridge**	Core sites
15	**Tuolumne River at Modesto**	Intermittent
16	**Merced River at River Road**	Core sites
17	**Merced River near Stevinson**	Intermittent
18	**Mud Slough near Gustine**	Core sites, Wetland
19	**Salt Slough at Lander Avenue**	Core sites, Wetland
20	**Los Banos Creek Flow Station**	Core sites, Wetland
21	**Orestimba Creek at River Road**	Core sites, BMP
22	**Modesto ID Lateral 4 to SJR**	Intermittent
23	**Modesto ID Lateral 5 to Tuolumne**	Core sites
24	**Modesto ID Lateral 6 to Stanislaus River**	Intermittent
25	**Modesto ID Main Drain to Stan. R. via Miller Lake**	Core sites
26	**Turlock ID Highline Spill**	Intermittent
27	**Turlock ID Lateral 2 to SJR**	Intermittent
28	**Turlock ID Westport Drain Flow station**	Core sites
29	**Turlock ID Harding Drain**	Core sites
30	**Turlock ID Lateral 6 & 7 at Levee**	Core sites
31	**BCID - New Jerusalem Drain**	Intermittent
32	**El Solyo WD - Grayson Drain**	Intermittent, BMP
33	**Hospital Creek**	Intermittent, BMP
34	**Ingram Creek**	Core sites, BMP
35	**Westley Wasteway Flow Station**	Intermittent, BMP
36	**Del Puerto Creek Flow Station**	Core sites, BMP
37	**Newman Wasteway at SJR**	Intermittent
38	**Marshall Road Drain**	Intermittent, BMP
39	**Salado Creek Flow Station**	Intermittent, BMP
40	**Patterson Irrigation District Diversion**	Diversion
41	**West Stanislaus Irrigation District Diversion**	Diversion
42	**Banta Carbona Irrigation District Diversion**	Diversion
43	**El Solyo Water District Diversion**	Diversion

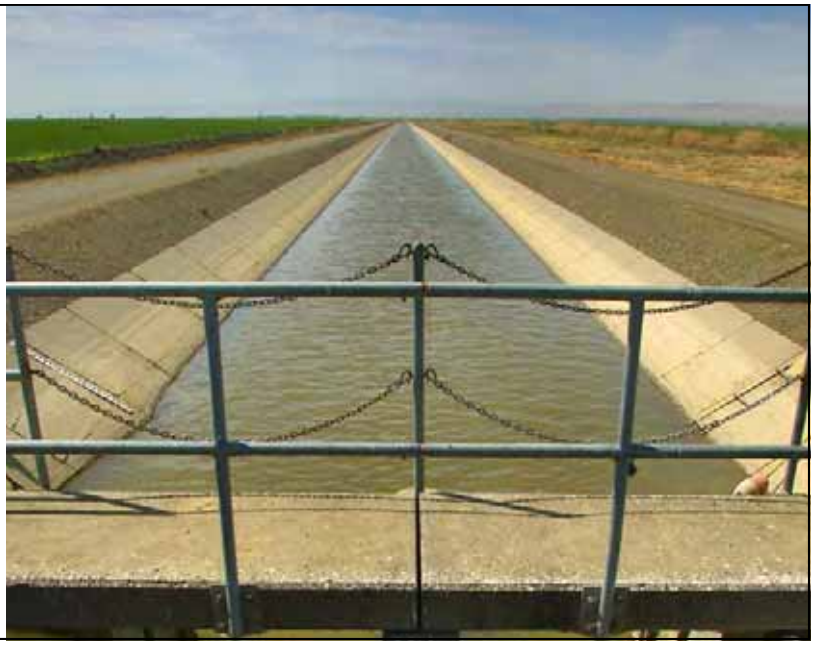
DO Number	*Site Name*	*Type*
44	**San Luis Drain End**	Core sites
45	**Volta Wasteway at Ingomar Grade**	Intermittent
46	**Mud Slough at Gun Club Road**	Intermittent, Wetland
47	**Delta-Mendota Canal inlet to the Mendota Pool**	Intermittent, BMP
48	**San Luis Drain Site A**	Intermittent
49	**FC-5 - Grassland Area Farmers**	Intermittent
50	**PE-14 - Grasslands Area Farmers**	Intermittent
51	**Arroyo Canal**	Intermittent
52	**Salt Slough at Sand Dam**	Intermittent
53	**Salt Slough at Wolfsen Road**	Wetland
54	**Los Banos Creek at Ingomar Grade**	Intermittent
55	**Modesto WWTP**	NPDS
56	**Turlock WWTP**	NPDS
57	**Ramona Lake Drain**	Core sites, BMP
58	**San Luis Drain Site B**	Intermittent
59	**SJR Laird Park**	Core sites
60	**Moffit 1 South**	Wetland
61	**Deadmans Slough**	Wetland
62	**Mallard Slough**	Wetland
63	**Inlet C Canal**	Wetland
64	**Moran Drain**	Intermittent
65	**Spanish Grant Drain**	Intermittent, BMP
66	**ESWD Maze Blv. Drain**	Intermittent, BMP
67	**Newman Wasteway at Brazo Road**	Intermittent
68	**S-Lake Basin**	Wetland
69	**Santa Fe Canal**	Intermittent
80	**South Marsh-1-Inlet**	Wetland
81	**South Marsh-1-Outlet**	Wetland
82	**South Marsh-3-Inlet**	Wetland
83	**South Marsh-3-Outlet**	Wetland
84	**SJR at Highway 4 (Garwood Bridge Charter Way)**	Intermittent
85	**SJR Hills Ferry**	Intermittent
86	**Ramona drain Apple Ave**	BMP
87	**Ramona drain Prune Ave**	BMP
88	**Ramona drain Apricot Ave**	BMP
89	**Ramona drain Pomelo Ave**	BMP
90	**Ramona drain Almond Ave**	BMP
91	**Paradise drain Prune Ave**	BMP
92	**Paradise drain Apricot Ave**	BMP
93	**Paradise drain Pomelo Ave**	BMP
94	**Paradise drain Almond Ave**	BMP
95	**Ramona drain at Ramona Lake**	BMP, Intermittent
96	**WPF-VD-1**	BMP

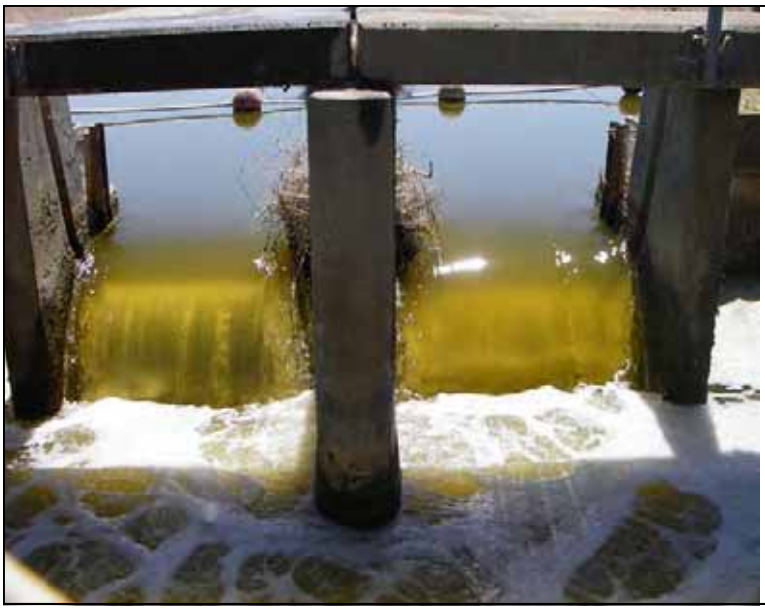
DO Number	*Site Name*	*Type*
97	**WPF-VD-2**	BMP
98	**WPF-VD-3**	BMP
99	**WPF-VD-4**	BMP
100	**WPF-VD-5**	BMP
101	**WPF-UD-IN**	BMP
102	**WPF-UD-OUT**	BMP
103	**SLD Check 18**	Intermittent
104	**SLD Check 16**	Intermittent
105	**SLD Check 15**	Intermittent
106	**SLD Check 14**	Intermittent
107	**SLD Check 13**	Intermittent
108	**SLD Check 12**	Intermittent
109	**SLD Check 11**	Intermittent
110	**SLD Check 10**	Intermittent
111	**SLD Check 9**	Intermittent
112	**SLD Check 8**	Intermittent
113	**SLD Check 7**	Intermittent
114	**SLD Check 6**	Intermittent
115	**SLD Check 5**	Intermittent
116	**SLD Check 4**	Intermittent
117	**SLD Check 3**	Intermittent
118	**SLD Check 2**	Intermittent
119	**SLD Check 1**	Intermittent
120	**South Marsh-1-Intermediary**	Wetland
121	**South Marsh-1-East**	Wetland
122	**South Marsh-1-West**	Wetland
123	**Ramona Lake NW Quad**	BMP
124	**Ramona Lake NE Quad**	BMP
125	**Ramona Lake SW Quad**	BMP
126	**Ramona Lake SE Quad**	BMP
127	**SJR at Brant Bridge**	Intermittent
128	**SJR Brickyard Site**	Intermittent
129	**Hollow Tree drain**	Wetland
130	**Marshall Reservoir inlet**	BMP
131	**Marshall Reservoir outlet**	BMP
132	**Marshall RR Pond-1-West**	BMP
133	**Marshall RRr Pond-2-East**	BMP
135	**MID Main Drain Spill**	Intermittent

January 13, 2005

SLD Sampling Event
Sampling for SLD sites. The crew sampled the check stations along the San Luis Drain.

DO-50 San Luis Drain Site A (Check 17)
A stretch of the San Luis Drain near Site A.

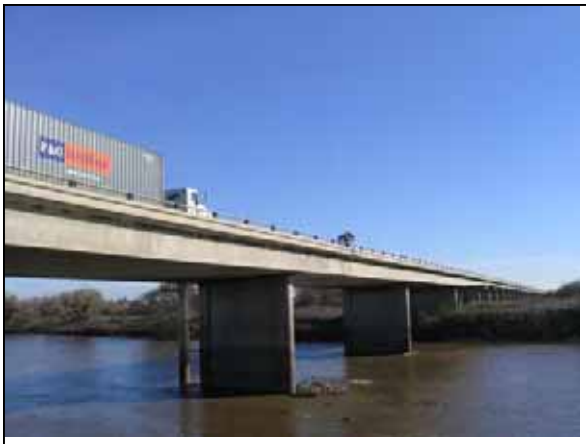




DO-104 San Luis Drain Check 16
Water flowing over a weir structure at a check station along the San Luis Drain.

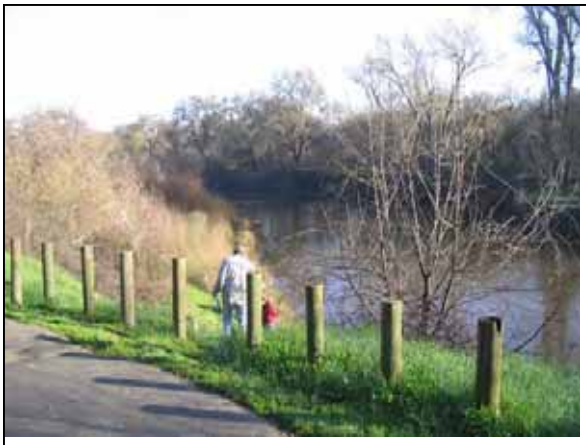
February 01, 2005

Sampling Site Scouting Trip
The crew spent the day scouting sample site locations with Randy Dahlgren (UC Davis).

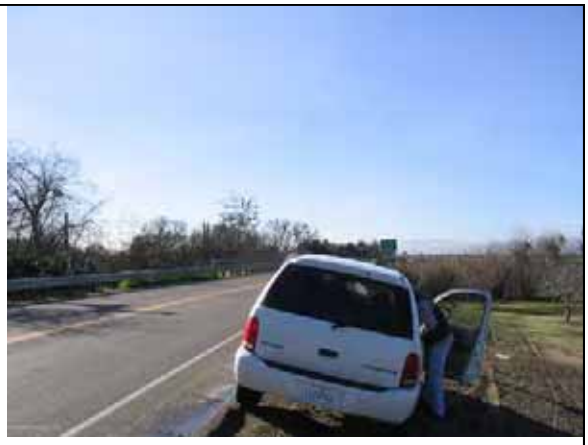


DO-06 SJR at Maze
Maze Blvd crossing the San Joaquin River.

DO-19 Salt Slough at Lander
Sharon Borglin is returning from scouting out the sample site at DO-19 Salt Slough at Lander.



DO-12 Stanislaus River at Caswell
Randy Dahlgren (UC Davis) pointing out a sample location along the Stanislaus River.

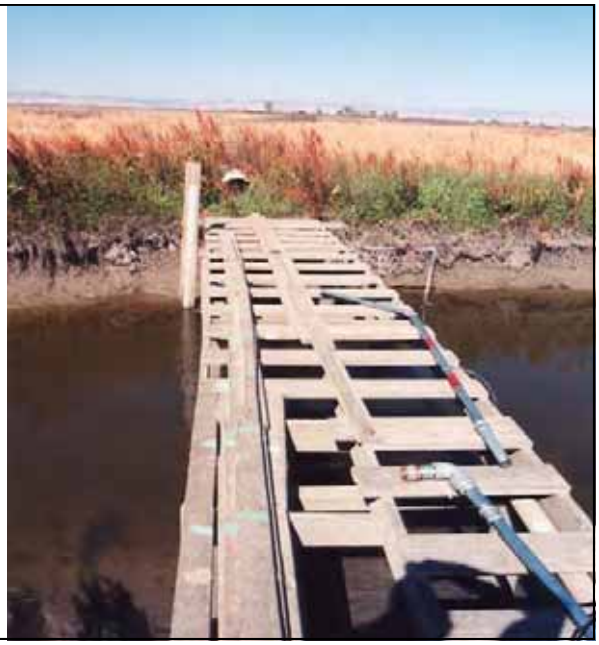


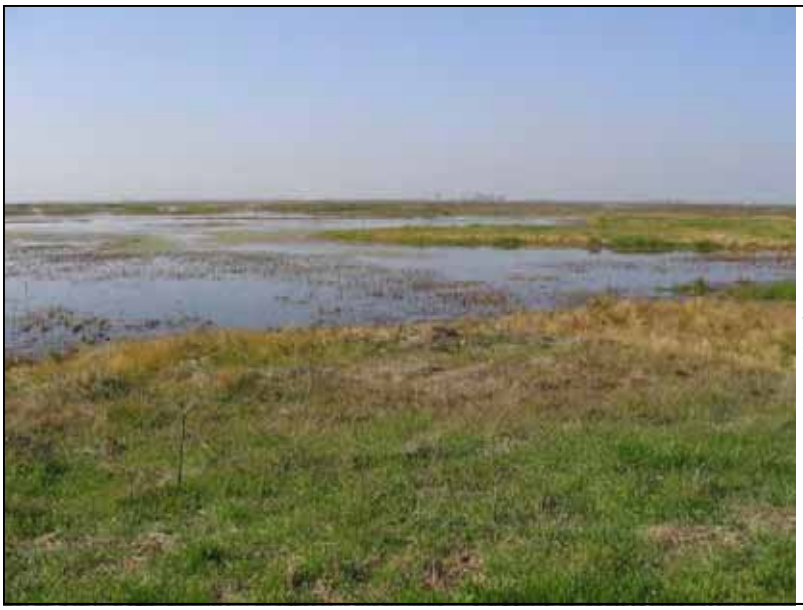
DO-14 Tuolumne River at Shiloh
Photo showing the crew's vehicle near Shiloh Bridge over the Tuolumne.

February 03, 2005

Grasslands Station Maintenance and QA
Met with Lara Sparks (Grasslands Water District/Department of Fish and Game) and Rich Wright (California Water Foul Association) to assist with stream ratings and station maintenance at the DO sites they manage within the Grasslands water district.

DO-20 Los Banos Creek Flow Station
Picture showing the wood bridge over Los Banos Creek. The bridge was washed out in late 2005.

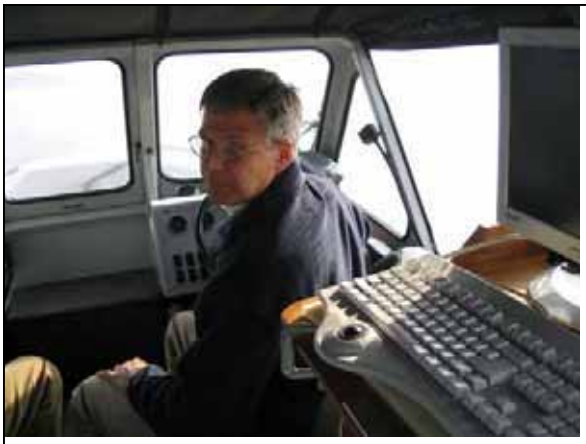




Kesterson Unit
Flooded wetland in the Kesterson unit of the San Luis National Wildlife Refuge.

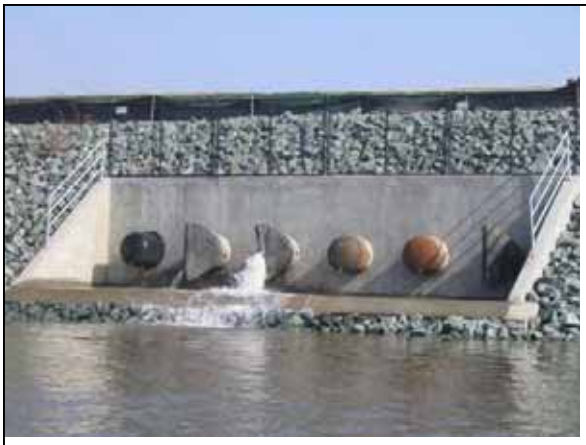
February 04, 2005

Boat Survey
The crew spent the day surveying sites by boat along the San Joaquin River from Stockton to DO-31 New Jerusalem Drain with Gary Litton (University of the Pacific).

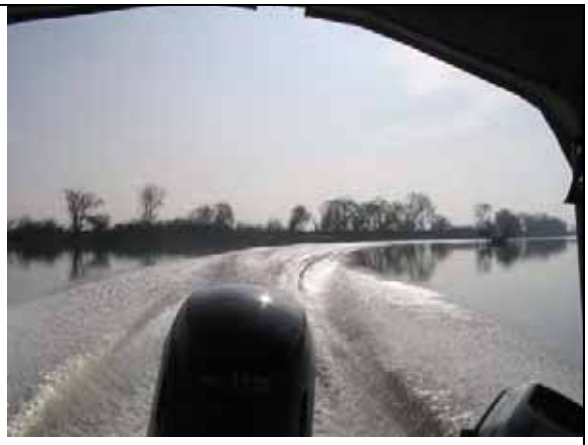


Gary Litton's Sampling Boat
Gary Litton surveying sites along the San Joaquin River.

Aeration Facility
Aeration facility near channel point in the Deep Water Ship Channel.



Input into San Joaquin River
Picture depicting a point source into the San Joaquin River.



San Joaquin River
A view from the back of Gary Litton's boat.

March 08, 2005

TID and MID Meeting
The crew met with Kieth Larson (TID) and Michael Niemi (MID) to look for possible sampling locations within Turlock Irrigation District and Modesto Irrigation District.

DO-26 TID Highline Spill
Highline Spill is managed by the Turlock Irrigation District. Flow data is collected from this site.

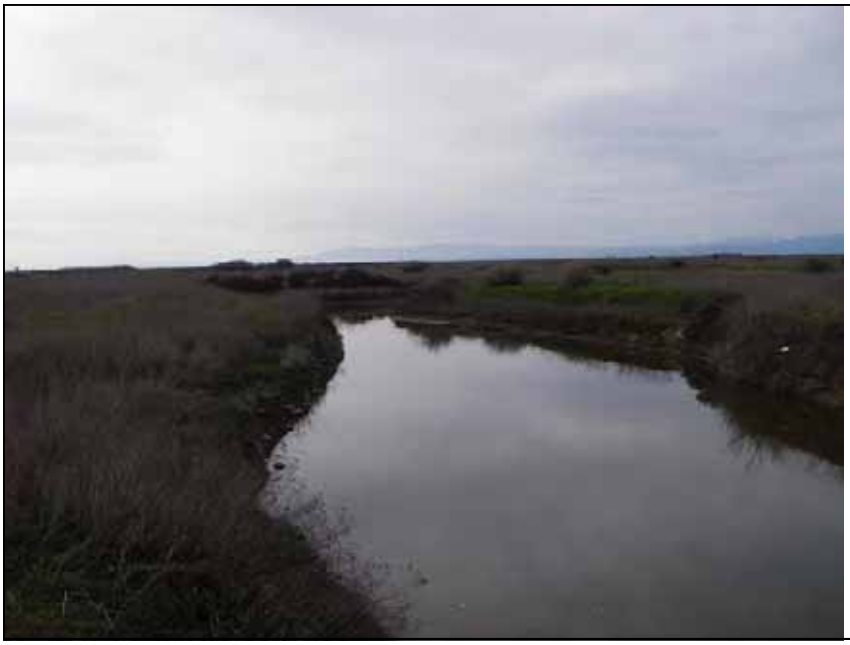
DO-27 TID Lat 2 to SJR
TID Lat 2 before spilling into the San Joaquin River.

DO-23 MID Lat 5 to the Tuolumne
Paradise Road crossing MID Lat 5 to the Tuolumne.

DO-25 MID Miller Lake
Photo showing Miller Lake.

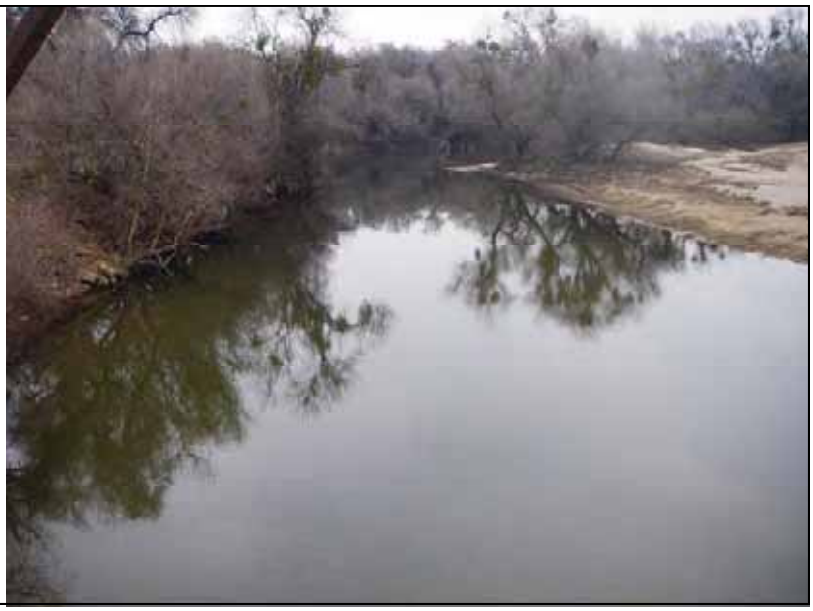
March 10, 2005

Core Sampling Event
Sampling for core sites.



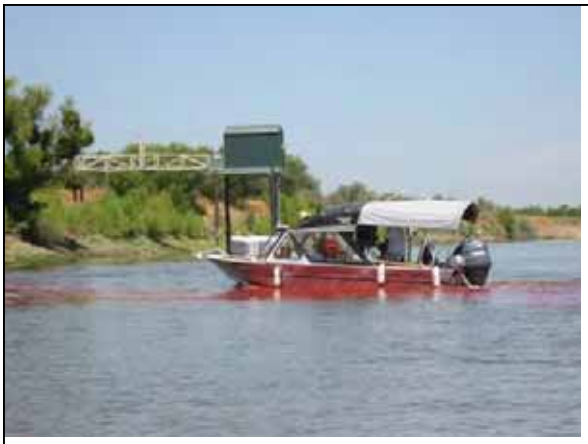
DO-18 Mud Slough Near Gustine
Photo of Mud Slough in the San Luis National Wildlife Refuge.

DO-16 Merced River at River Road
Merced River is sampled from the Old Bridge using a bucket to collect the sample water.



March 24, 2005

Dye Study
Dye study along the San Joaquin River with Gary Litton (University of the Pacific).



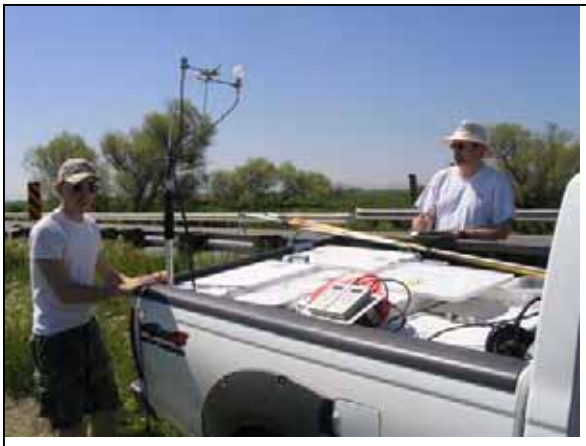
Gary Litton's Sampling Boat
Gary Litton preparing to release and track the dye in the San Joaquin River.

DO-05 SJR at Vernalis
When the dye is first dispensed it causes the river to take on a red hue.

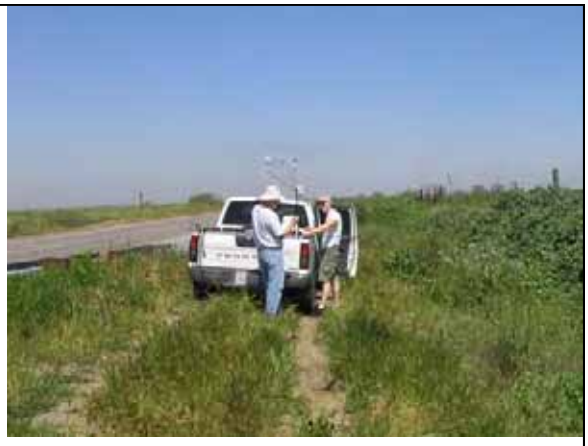
DO-05 SJR at Vernalis
Gary Litton and crew tracking the dye as it moves downstream.

March 31, 2005

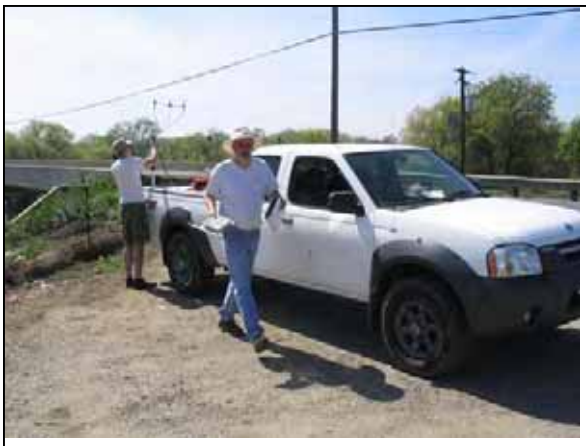
Core Sampling Event
Sampling for core sites.



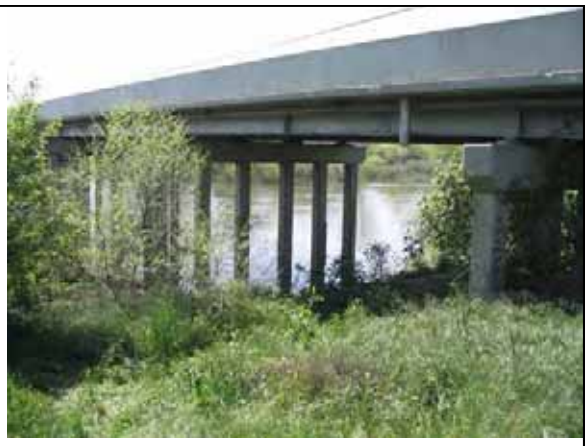
DO-19 Salt Slough at Lander
Will Stringfellow and a Student Intern setting up the PAR sensors to record a light measurement.



DO-19 Salt Slough at Lander
Sampling crew recording light measurements from the PAR meters.



DO-08 SJR at Crows Landing
Sampling crew getting ready to go to the next sample location.

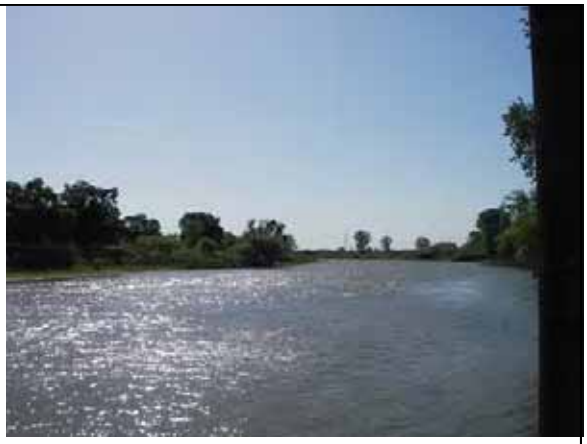


DO-08 SJR at Crows Landing
The bridge at SJR at Crows Landing was used before crews had permission to use the dock at the Turlock Sportsman's Club.

April 21, 2005

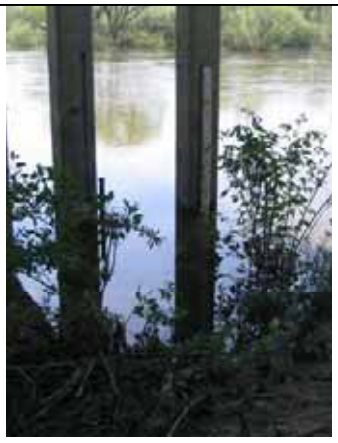
Core Sampling Event
Sampling for core sites.

DO-36 Del Puerto Creek
Picture of the sample location at Del Puerto Creek.



DO-06 SJR at Maze
The San Joaquin River near Maze Blvd.

DO-19 Salt Slough at Lander
Sample location at Salt Slough near Lander Ave.

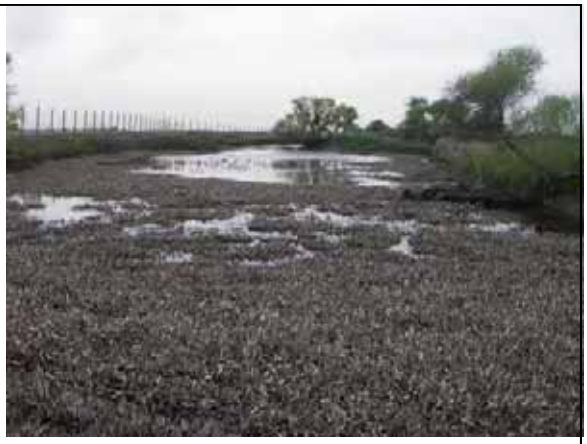


DO-08 SJR at Crows Landing
Sample location under the bridge at DO-08 San Joaquin River at Crows Landing.

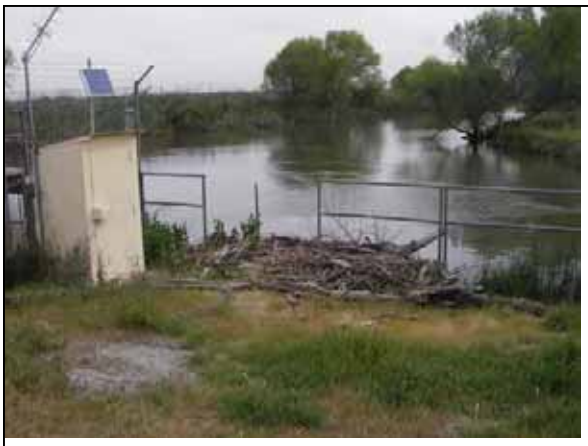
April 27, 2005

Wetland Station Maintenance
Performed maintenance on Wetland stations. Stations were visited for data downloads, cleaning, flow, EC, and temperature QA.

San Luis National Wildlife Refuge
Picture of a coyote in the wetlands.



DO-62 Mallard Slough
Mallard Slough from inside the Elk Pasture.



DO-61 Deadmans Slough
Photo of debris placed over the weir structure by beavers.

DO-63 Inlet C Canal
Sample site at Inlet C Canal which is the source water for the wetlands.

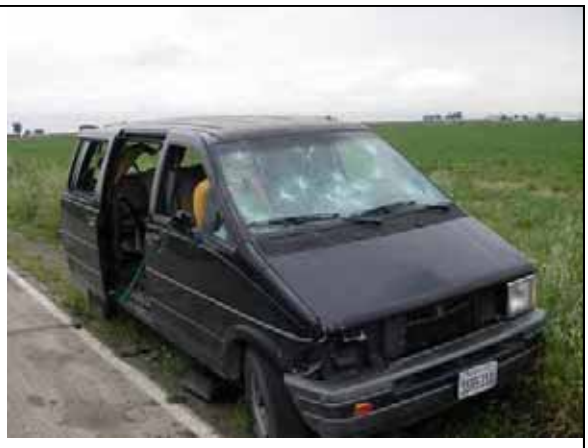
May 05, 2005

Core Sampling Event and Sampling Site Scouting Trip
Sampling for core sites. Will Stringfellow and Gary Litton spent the day scouting sample site locations.

DO-32 Grayson Drain
Water flowing through El Solyo Water District's Grayson Drain.

DO-39 Salado Creek
A segment of Salado Creek near the flow station flows underground through pipes and can be accessed by openings like the one pictured above.

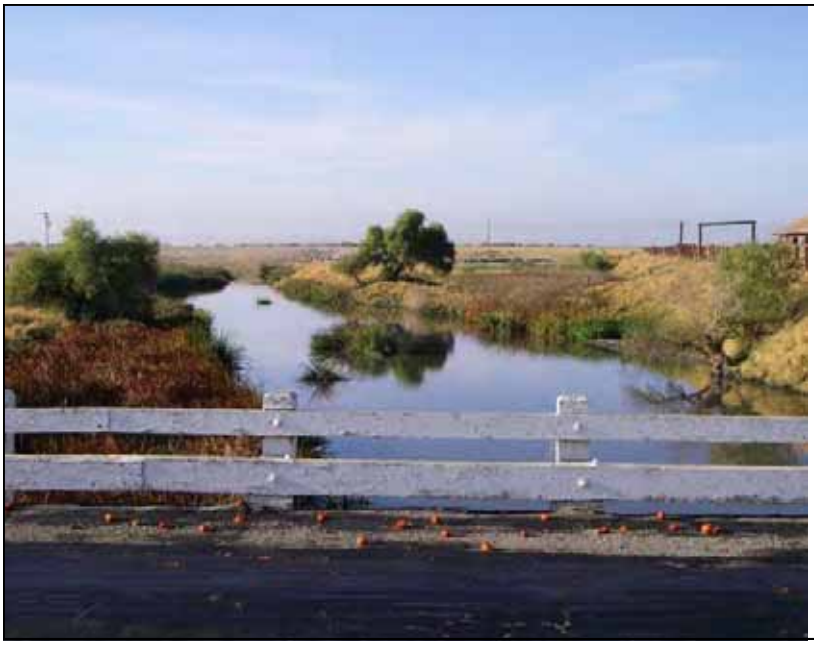
DO-05 San Joaquin River at Vernalis
Stilling wells for the instruments used by DWR at their Vernalis flow station.



Abandoned Vehicle
Photo of an abandoned vehicle the crew found while scouting potential sample sites.

May 17, 2005

Westside Station Maintenance
Performed maintenance on Westside stations. DO-35 Westley Wasteway, DO-33 Hospital Creek and DO-53 Salt Slough at Wolfsen were visited for data downloads, cleaning, flow, EC, and temperature QA. The Starflow was removed from Westley Wasteway to troubleshoot. Bubbler connector was leaking. It was reassembled and tested for leaks, but none were found.



DO-53 Salt Slough at Wolfsen
Sample location on Wolfsen bridge over Salt Slough. The EC cable was replaced at this site.

DO-33 Hospital Creek
Flow station shed at DO-33 Hospital Creek.

May 19, 2005

Core Sampling Event
Sampling for core sites. The crew sampled DO-12 Stanislaus River at Caswell from the beach in an eddy and DO-28 Westport Drain was sampled from Jennings Road.

DO-59 SJR at Laird Park
Sample location along the San Joaquin River at Laird Park.

DO-05 SJR at Vernalis
DWR flow station at Vernalis.

DO-06 SJR at Maze
San Joaquin River at Maze blvd.

May 23-27, 2005

Confined Space Training
Jeremy Hanlon, Will Stringfellow, and Jesse Merkel attended a confined space training course with the Stockton Fire Department. Confined spaces are a routine part of Westside maintenance and they require special training to enter them.

Confined Space Training
Photo showing one of the class members crawling over another member inside a concrete pipe.

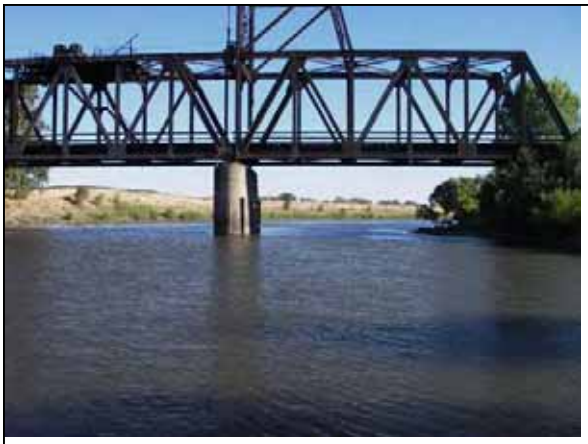
Confined Space Training
Will Stringfellow with all of his safety equipment getting ready to go into an underground confined space.

Confined Space Training
Jeremy Hanlon about to be lowered down a grain silo to rescue a pretend victim at the bottom of the silo.

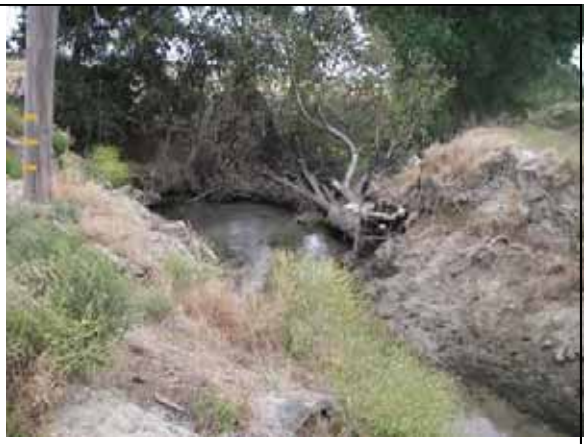
Port of Stockton
Class members inside of a concrete ship performing a staged rescue.

June 02, 2005

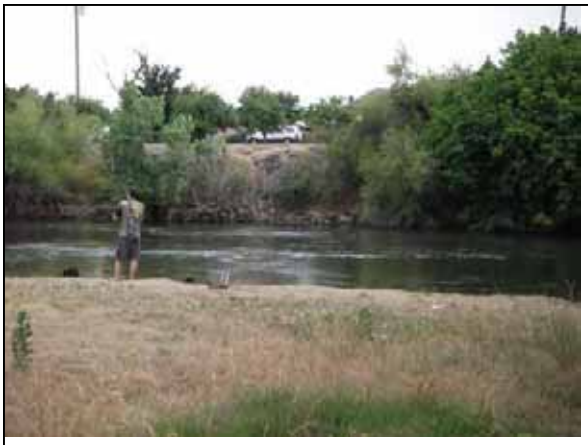
Core Sampling Event
Sampling for core sites.



DO-04 SJR at Mossdale
Picture of the train bridge over the San Joaquin River at Mossdale.



DO-28 TID Westport Drain
Westport Drain showing where old flow station had been washed out in the previous year.



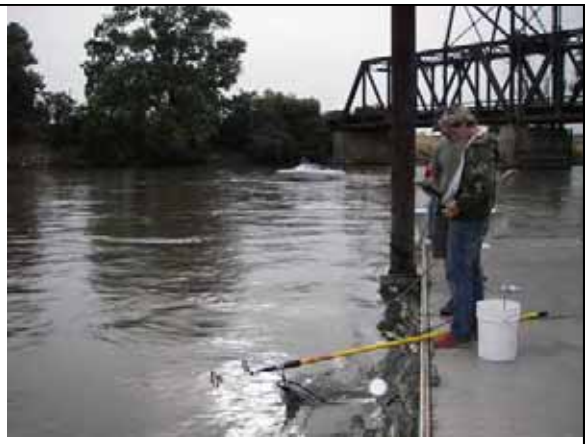
DO-14 Tuolumne River at Shiloh Bridge
Sampling crew member collecting water quality samples from the Tuolumne River.

DO-06 SJR at Maze
Pump platform where the crew collects water quality samples.

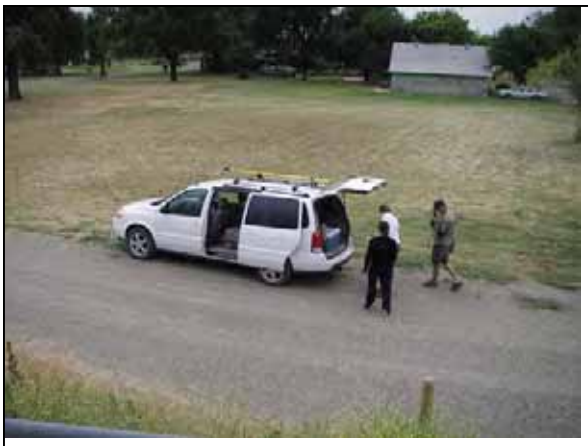
June 16, 2005

Core Sampling Event
Sampling for core sites.

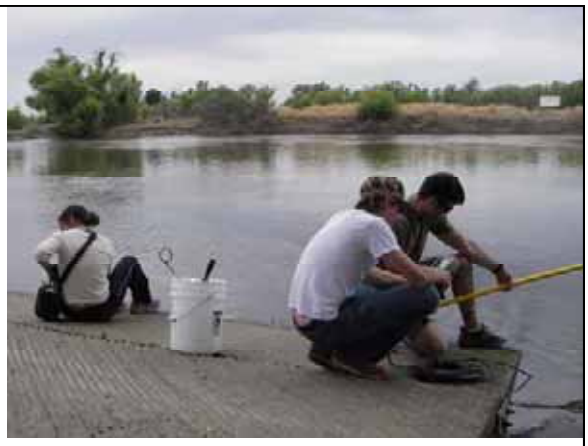
DO-29 Harding Drain
EERP van parked on the bridge over Harding Drain.



DO-04 SJR at Mossdale
Jesse Merkel and Student Intern collecting samples from the San Joaquin River.



DO-05 SJR at Vernalis
The sampling crew is getting ready to head to the next sampling location.

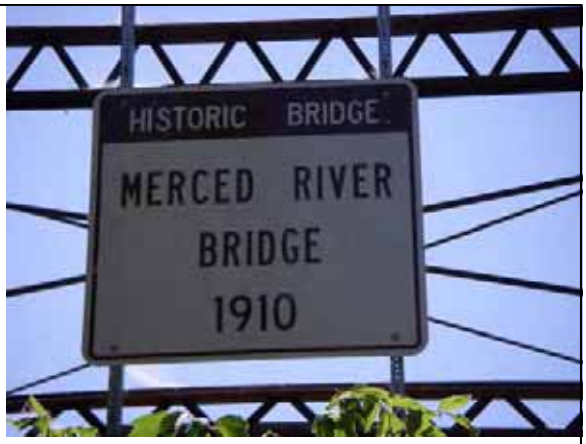


DO-07 SJR at Patterson
Sampling crew collecting a sample on the boat ramp.

June 30, 2005

Core Sampling Event
Sampling for core sites.

DO-18 Mud Slough near Gustine
Flow station shed on Mud Slough. The station is maintained by USGS.



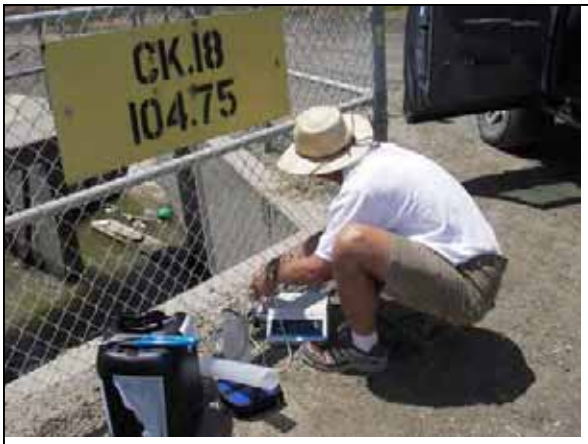
DO-16 Merced River at River Road
Sampling crews collect water samples from the old historic Merced River bridge at River Road.

DO-19 Salt Slough at Lander Ave
Picture looking upstream from the sampling location at Salt Slough at Lander Ave.

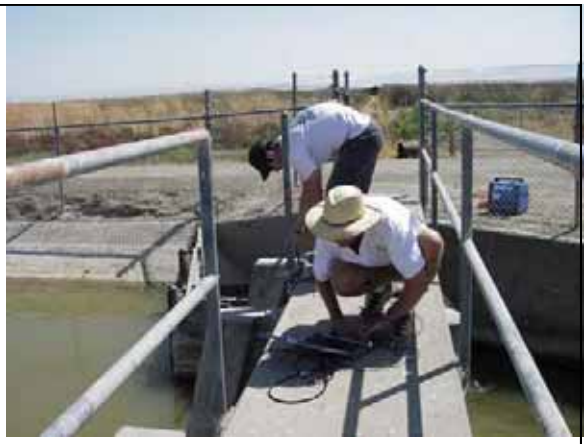
DO-04 SJR at Mossdale
Sampling crews collect water samples from the boat ramp floating dock at Mossdale Crossing Regional Park.

July 06, 2005

SLD Dye Study
Dye study along the San Luis Drain. The study started at the bridge upstream of Check 17. The crew collected readings of Rhodamine dye with the Hydrolab Multiprobe.

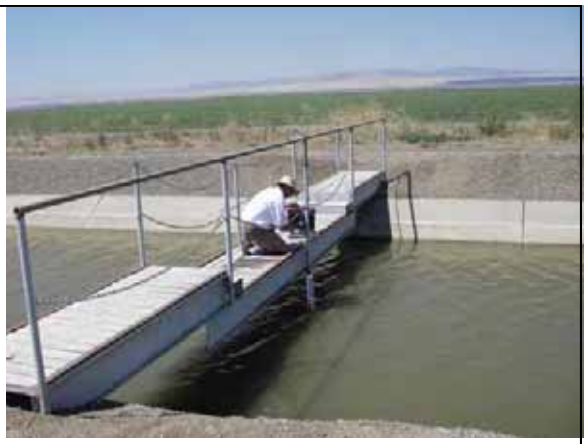


DO-103 San Luis Drain Check 18
Gary Litton setting up the Rhodamine dye to be dispensed into the San Luis Drain.



DO-104 San Luis Drain Check 16
Garry Litton and Jesse Merkel preparing to deploy a Hydrolab Multiprobe into the San Luis Drain.

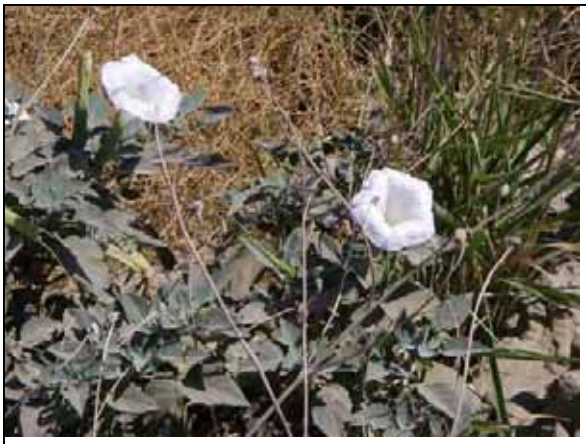
DO-103 San Luis Drain Check 18
Rhodamine dye was added to the San Luis Drain tinting the water with a red hue.



DO-50 San Luis Drain Site A (Check 17)
Gary Litton deploying a Hydrolab Multi-probe into the San Luis Drain just upstream of Check 17.

July 14, 2005

Core Sampling Event
Sampling for core sites. While at DO-25 MID Miller Lake the sampling crew noticed a fish kill near the inlet to Miller Lake. The crew recoded Sonde data along the canal to determine the cause of the fish kill.



Wildflowers
Many sample sites are surrounded by weeds and wildflowers like the one pictured above.

DO-25 MID Miller Lake
Dead fish floating in the canal at the inlet to Miller Lake.

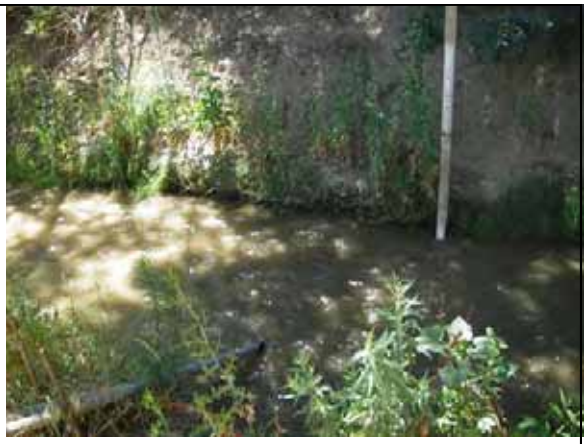
DO-25 MID Miller Lake
Cattle in the canal just upstream of the fish kill.

DO-25 MID Miller Lake
Sampling crew collecting data just upstream of the fish kill.

July 28, 2005

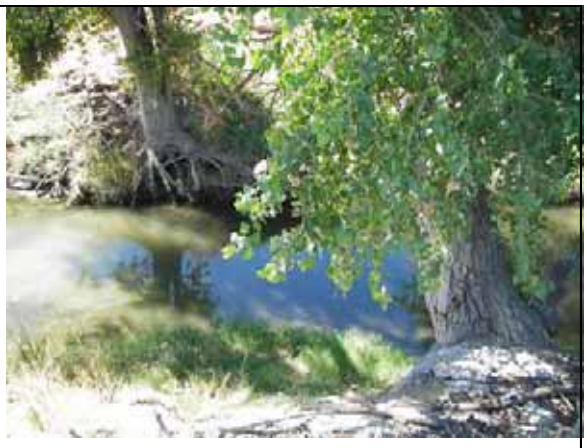
Core Sampling Event
Sampling for core sites.

DO-25 MID Miller Lake
Often times Miller Lake has a large amount of Duckweed floating on its surface.



DO-36 Del Puerto Creek.
The photo is depicting the bubbler line, EC line, and staff gauge located in Del Puerto Creek.

DO-19 Salt Slough at Lander Ave
Salt Slough flowing under the bridge.



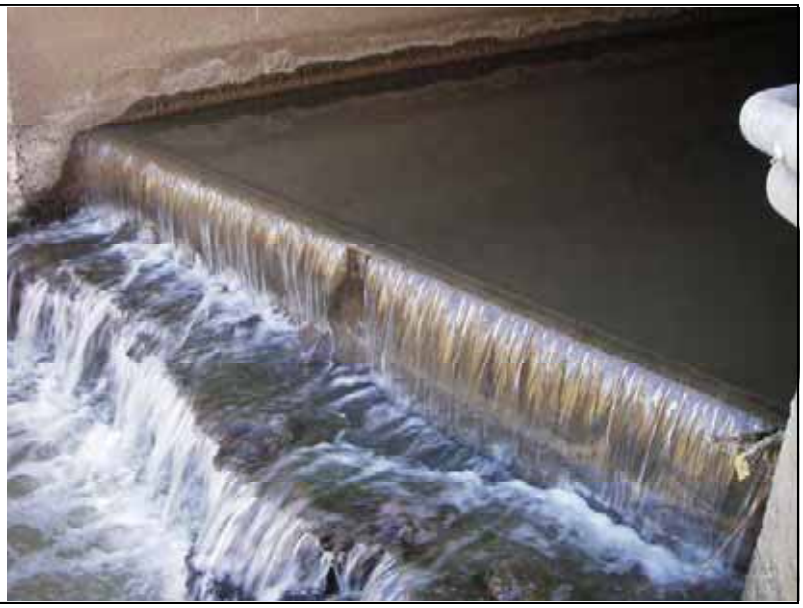
DO-28 TID Westport Drain
The sample location for Westport Drain is downstream of the flume structure and can be accessed from the levee road.

August 02, 2005

Westside Station Maintenance
Performed maintenance on Westside stations. DO-38 Marshall Drain, DO-64 Moran Drain, DO-65 Spanish Grant Drain, DO-57 Ramona Lake, DO-36 Del Puerto Creek, DO-35 Westley Wasteway, DO-34 Ingram Creek, and DO-33 Hospital Creek were visited for data downloads, cleaning, flow, EC, and temperature QA. The Starflow at Westley Wasteway was reinstalled.

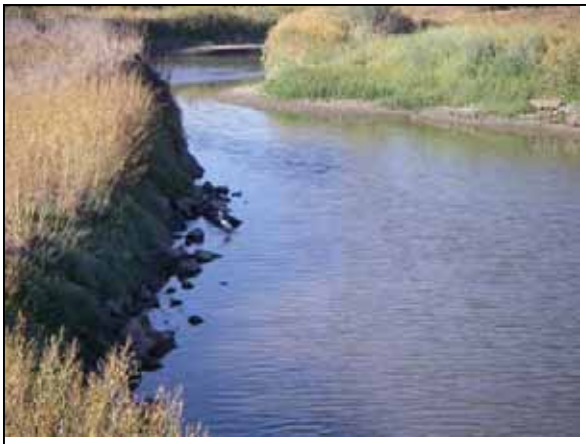
DO-35 Westley Wasteway
Weir structure confining the water in a pond at Westley Wasteway.

DO-34 Ingram Creek
Weir structure at DO-34 Ingram Creek.

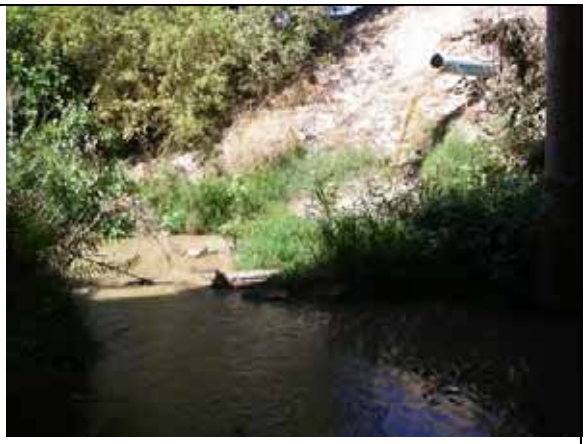


August 11, 2005

Core Sampling Event
Sampling for core sites.



DO-18 Mud Slough near Gustine
Photo of Mud Slough meandering through the San Luis National Wildlife Refuge.



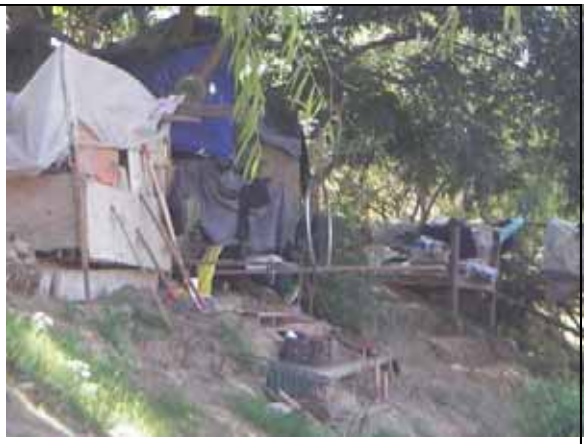
DO-21 Orestimba Creek
Water quality samples for Orestimba Creek are collected under the bridge next the flow station.

DO-44 San Luis Drain End
Weir structure at the end of the San Luis Drain.

August 17, 2005

Intermittent Sampling Site Scouting
Jeremy Hanlon and Jesse Merkel scouted out potential sample sites for intermittent sample events.

DO-15 Tuolumne River at Modesto
Flow station at the Tuolumne River at Modesto.



DO-15 Tuolumne River at Modesto
Transients living along the banks of the Tuolumne River near the flow station.

DO-24 MID Lat 6 to Stanislaus
Jeremy Hanlon standing next to MID Lat 6.

DO-13 Stanislaus River at Ripon
Jeremy Hanlon looking for a potential access point to collect a water quality sample.

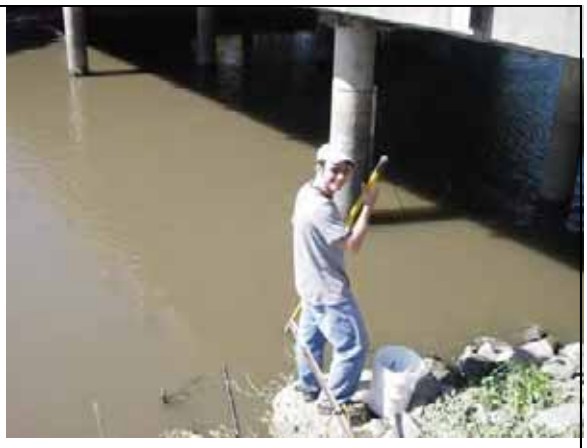
August 18, 2005

Intermittent Sampling Event
Sampling for Intermittent sites.

DO-52 Salt Slough at Sand Dam
Sample location at Salt Slough at Sand Dam.

DO-20 Los Banos Creek
Student Interns collecting water quality samples and taking notes at Los Banos Creek.

DO-17 Merced River at Stevinson
Jeremy Hanlon and Student Intern collecting sonde and flow data from the Merced River.

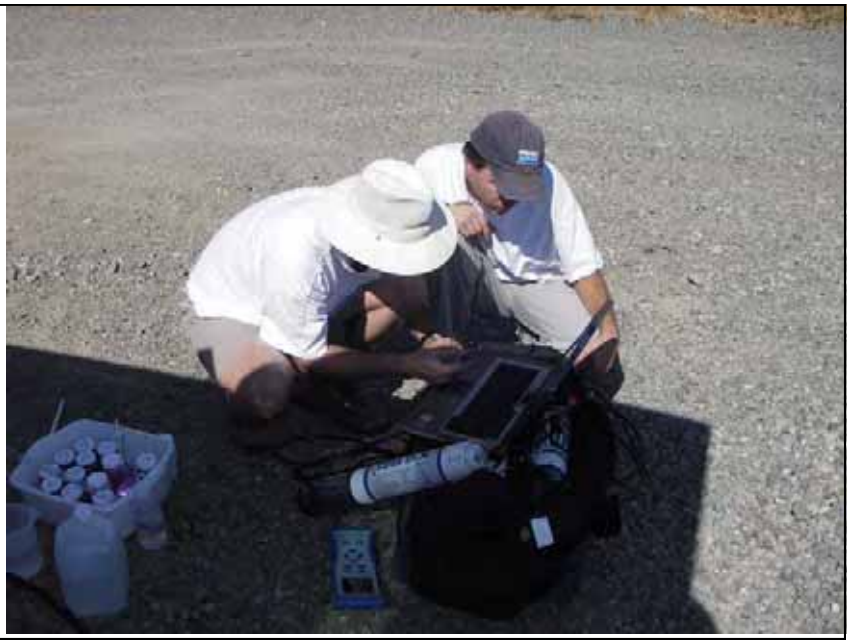


DO-19 Salt Slough at Lander Ave
Student Intern collecting water quality samples.

August 23, 2005

San Luis Drain TOC Study
Sampling for the San Luis Drain TOC Study.

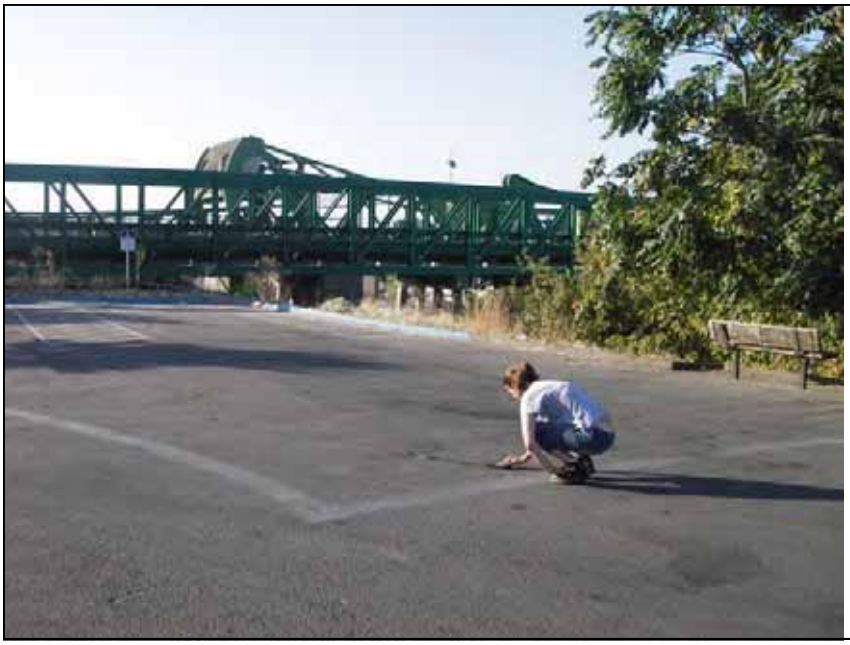
DO-44 San Luis Drain End
Jeremy Hanlon and Will Stringfellow setting up the Hydrolab Multiprobe with the laptop.



DO-44 San Luis Drain End
Photo of the San Luis Drain End.

August 25, 2005

Core Sampling Event
Sampling for core sites.



DO-04 SJR at Mossdale
Student Intern setting up the LUX meter to collect light data.

DO-04 SJR at Mossdale
Sample location at San Joaquin River at Mossdale.

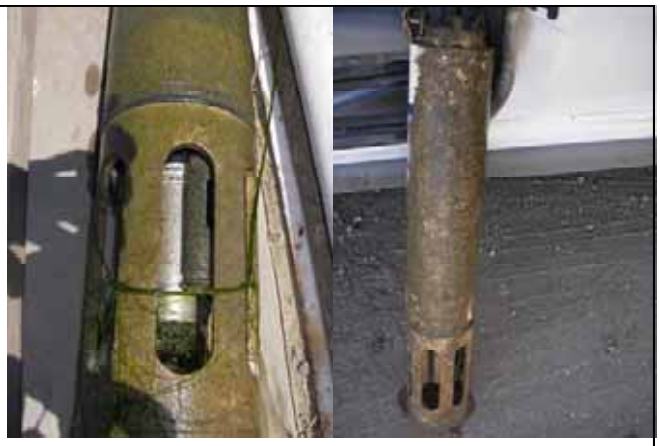
September 06, 2005

Westside Station Maintenance and San Luis Drain TOC Study
Performed maintenance on Westside stations. Stations were visited for data downloads, cleaning, flow, EC, and temperature QA. The Starflow was removed from DO-31 New Jerusalem Drain to troubleshoot back at the lab. The Hydrolab Multiprobe instruments were picked up after being deployed for the San Luis Drain TOC Study.

DO-31 New Jerusalem Drain
Jesse Merkel setting up the equipment for confined space entry.

DO-31 New Jerusalem Drain
Weir structure, bubbler line, and EC probe in the bottom of the manhole at New Jerusalem Drain.

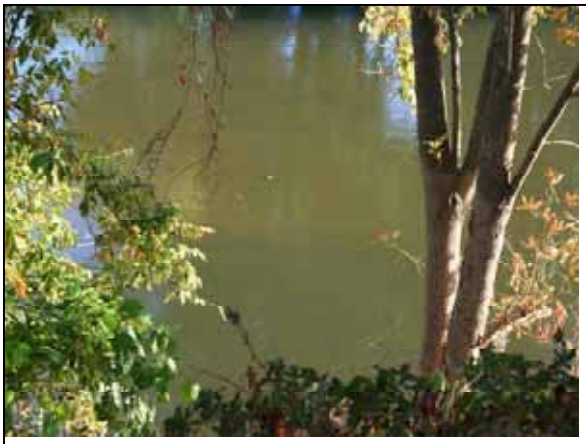
DO-50 PE-14 Grasslands Area Farmers
Jesse Merkel collecting the instruments that were deployed in the headwaters to the San Luis Drain.



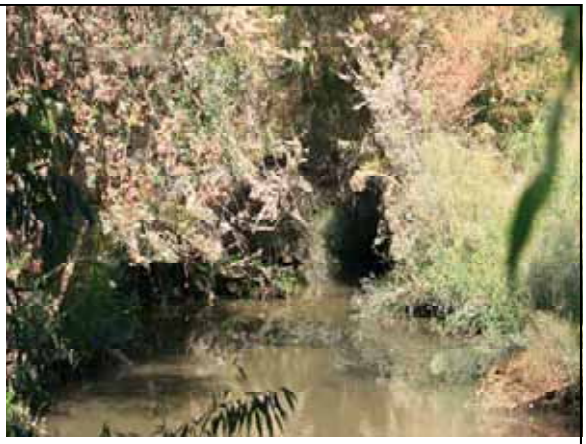
DO-50 PE-14 Grasslands Area Farmers
Pictures of a Hydrolab Multiprobe after being deployed in the headwaters to the San Luis Drain.

September 08, 2005

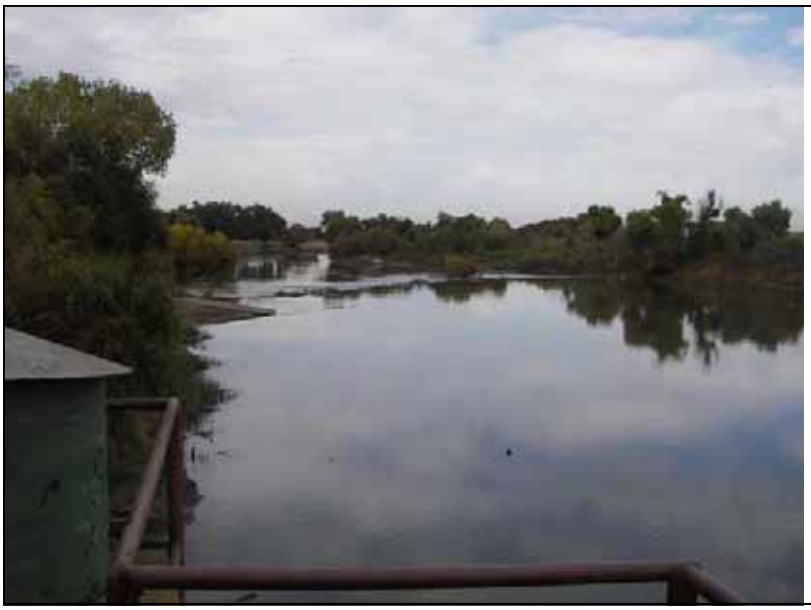
Core Sampling Event
Sampling for core sites.



DO-12 Stanislaus River at Caswell
Sample location along the Stanislaus in Caswell Park.



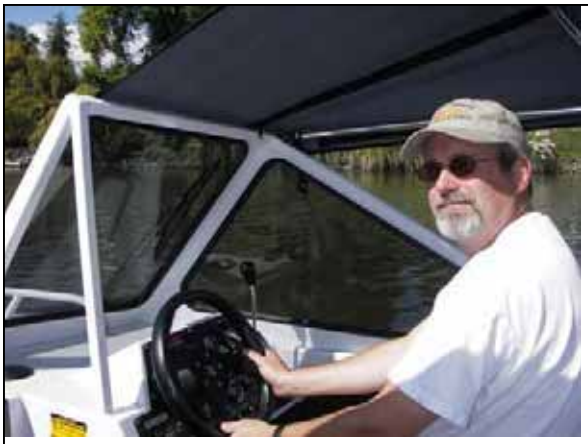
DO-25 MID Miller Lake
Picture looking downstream of weir structure at Miller Lake.



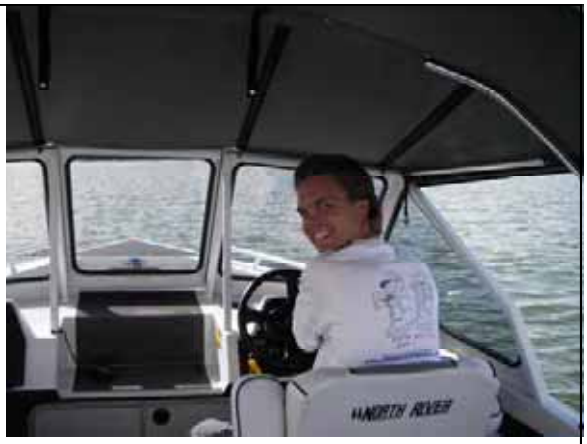
DO-07 SJR at Patterson
Photo of the boat ramp and low water near the pump platform at Patterson.

September 20, 2005

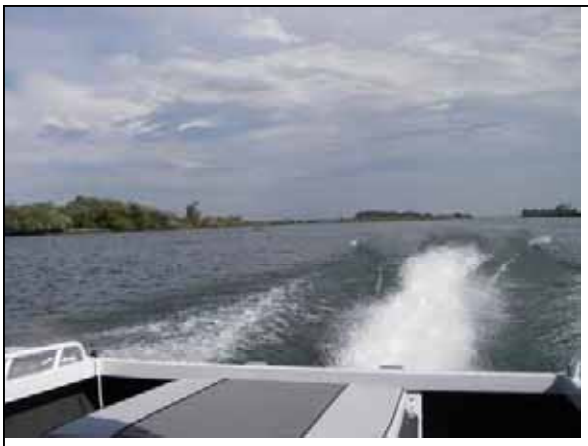
Boat Training Event
Jeremy Hanlon and Will Stringfellow took the EERP boat out for a test drive along the San Joaquin River.



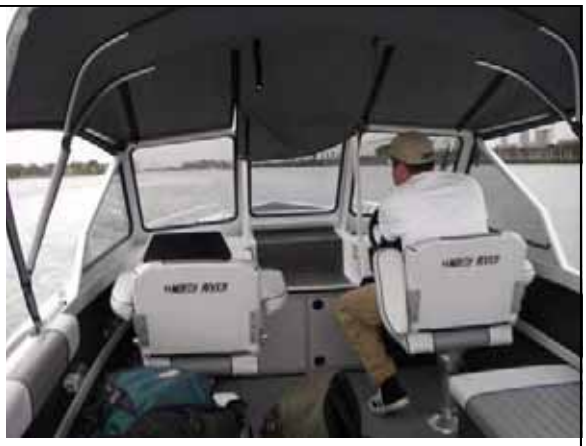
San Joaquin River
Will Stringfellow getting ready to try out the EERP boat.



San Joaquin River
Jeremy Hanlon taking his turn at piloting the boat.



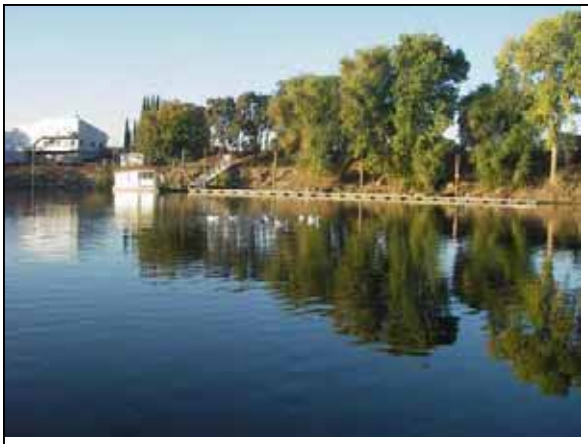
San Joaquin River
View from the back of the boat.



San Joaquin River
Will Stringfellow piloting the boat around the San Joaquin River.

September 22, 2005

Core Sampling Event
Sampling for core sites.



DO-04 SJR at Mossdale
San Joaquin River at Mossdale.

DO-06 SJR at Maze
Water quality samples are collected off of the pump platform at Maze.

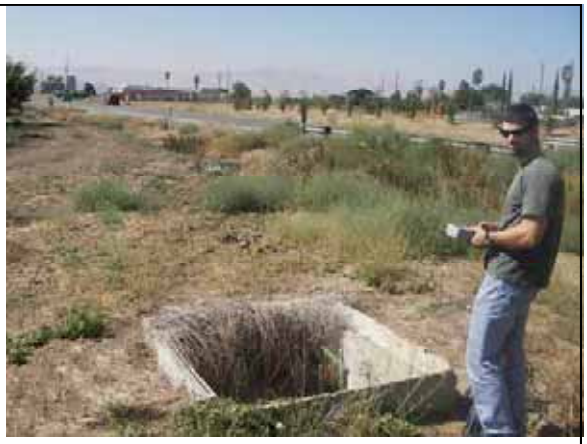
DO-10 SJR at Lander Ave
Sampling location at DO-10 San Joaquin River at Lander Ave.

DO-08 SJR at Crows Landing
San Joaquin River from the dock at the Turlock Sportsmans Club.

September 29, 2005

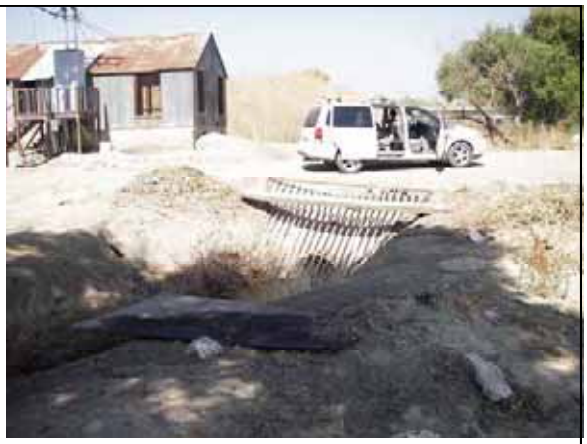
Intermittent Sampling Event
Sampling for Intermittent sites.

DO-32 El Solyo Water District Grayson Drain
Photo of one of the many field hazards encountered during sampling trips.



DO-32 El Solyo Water District Grayson Drain
Jesse Merkel preparing to collect sonde data from Grayson Drain.

DO-66 El Solyo Water District Maze Blvd Drain
Sample location at Maze Blvd Drain. The drain is next to DO-06 SJR at Maze.

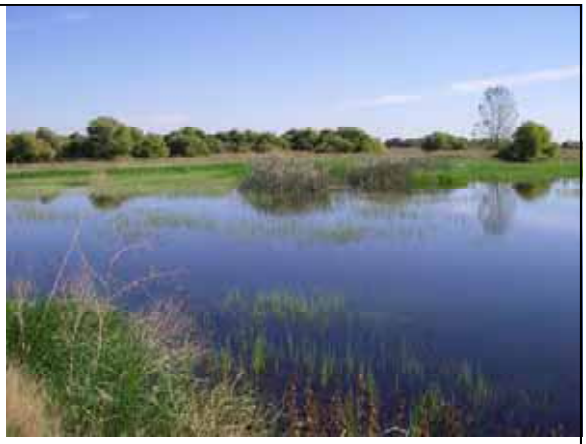


DO-66 El Solyo Water District Maze Blvd Drain
Picture of the EERP van parked next to the sampling site.

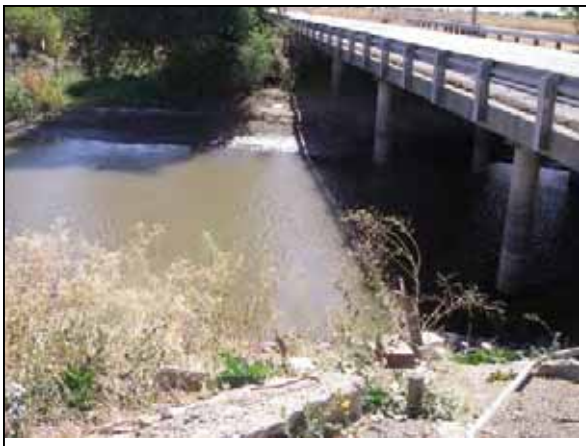
October 04, 2005

Wetland Sampling Event
Sampling for wetland sites.

DO-63 Inlet C Canal
Inlet C Canal supplies water to the San Luis National Wildlife Refuge.



South Marsh 1
Photo of South Marsh 1 when it is flooded.



DO-19 Salt Slough at Lander
Sample location at DO-19 Salt Slough at Lander Ave.

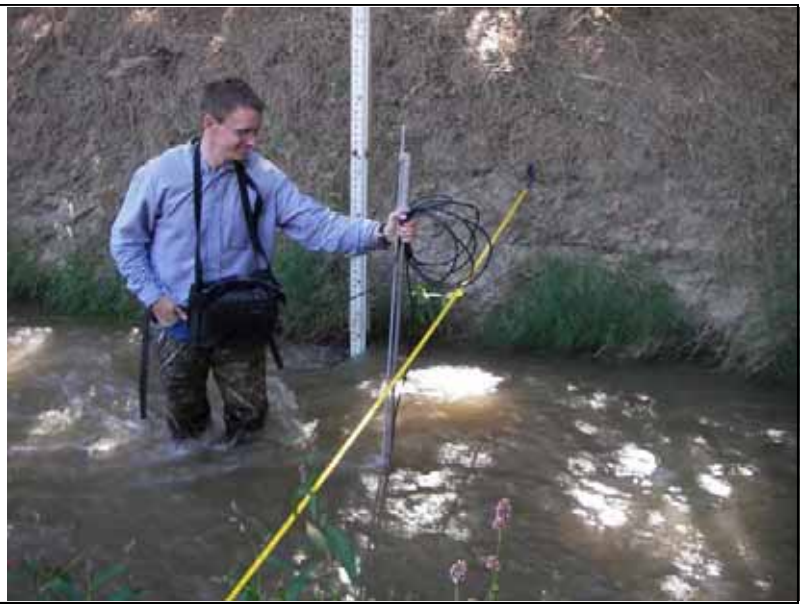
DO-53 Salt Slough at Wolfsen
Flow station on Salt Slough at Wolfsen bridge.

October 05, 2005

Westside Station Maintenance
Performed maintenance on Westside stations. Stations were visited for data downloads, cleaning, flow, EC, and temperature QA. The Starflow at DO-31 New Jerusalem Drain was reinstalled.

DO-38 Marshall Drain
Chris Linneman (Summers Engineering) collecting stage and flow QA data from the bottom of the Marshall Drain manhole.

DO-36 Del Puerto Creek
Chris Linneman performing a flow rating at Del Puerto Creek.

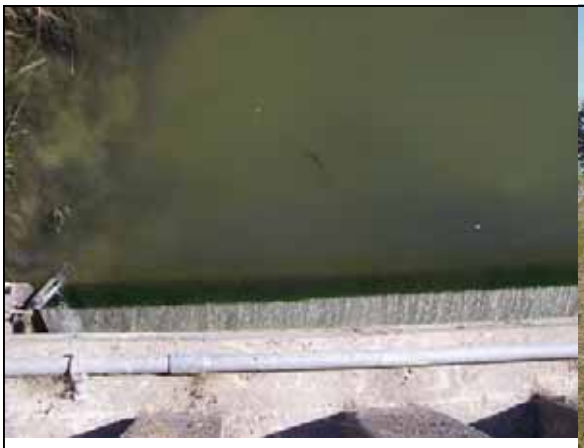


October 06, 2005

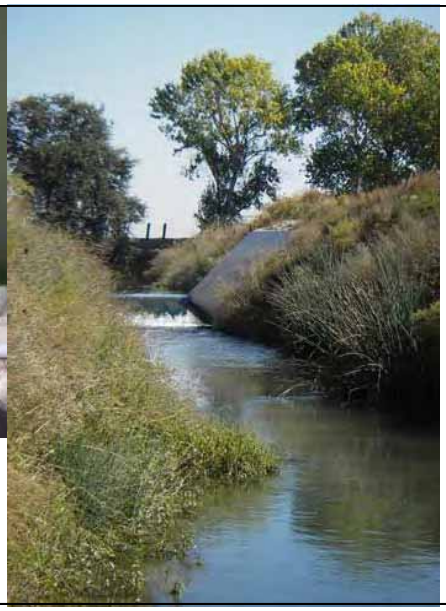
Core Sampling Event
Sampling for core sites.

DO-18 Mud Slough near Gustine
Samples are taken at the bridge that crosses over Mud Slough in the San Luis National Wildlife Refuge.

DO-16 Merced River at River Road
Merced River from the old bridge.



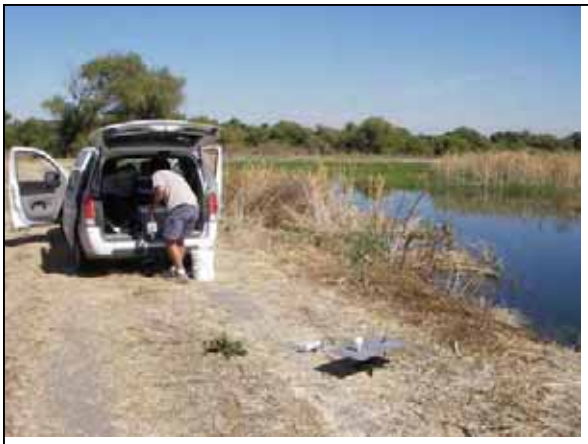
DO-29 TID Harding Drain
Water flowing over the weir structure in Harding Drain.



DO-28 TID Westport Drain
Water flowing through the concrete flume.

October 11, 2005

Wetland Sampling Event
Sampling for wetland sites. A Starflow unit was installed at DO-62 Mallard Slough.



DO-81 South Marsh 1 Outlet
Sampling crew are preparing to collect a sample.

DO-62 Mallard Slough
Photo taken from inside the culvert under the road.

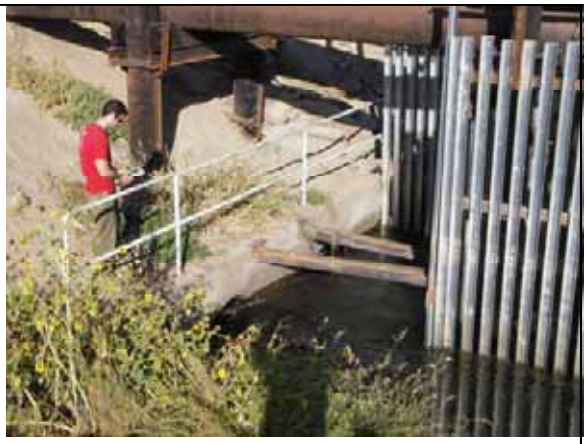
DO-62 Mallard Slough
Underwater picture of the newly installed Starflow unit at DO-62 Mallard Slough.

DO-81 South Marsh 1 Outlet
Sonde data is being collected at the outlet structure in South Marsh 1.

October 13, 2005

Intermittent Sampling Event
Sampling for Intermittent sites.

DO-67 Newman Wasteway at Brazo Road
Jesse Merkel collecting sonde data at Newman Wasteway.



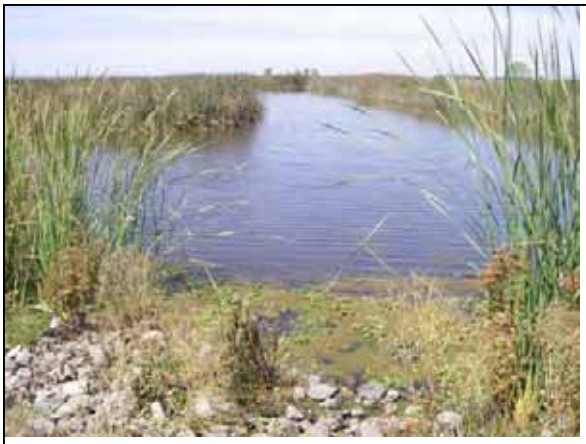
DO-30 TID Lat 6 and 7
Jesse Merkel deploying the sonde to collect data from TID Lat 6 and 7 before it flows under the levee.

DO-31 BCID New Jerusalem Drain
Sampling crew preparing to collect a sample from New Jerusalem Drain.

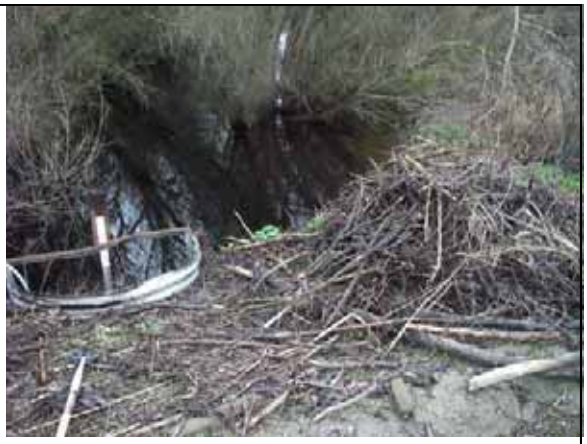
DO-35 Westley Wasteway
Westley Wasteway just upstream of the flow station.

October 18, 2005

Wetland Sampling Event
Sampling for wetland sites.

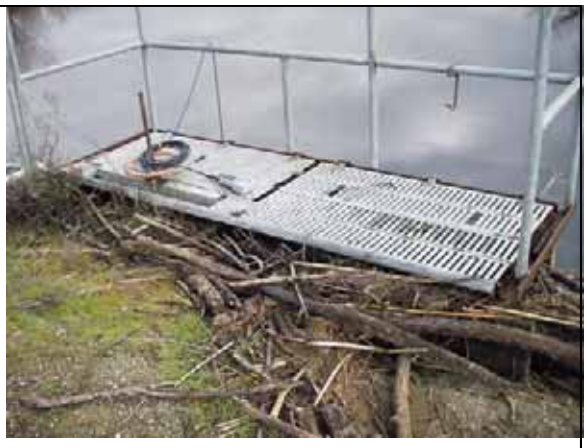


DO-82 South Marsh 3 Inlet
The inlet to the permanent wetland.



DO-60 Moffit 1 South
Beaver debris often clogs up the weir structure which has to be cleared.

DO-62 Mallard Slough
Mallard Slough in the San Luis National Wildlife Refuge.



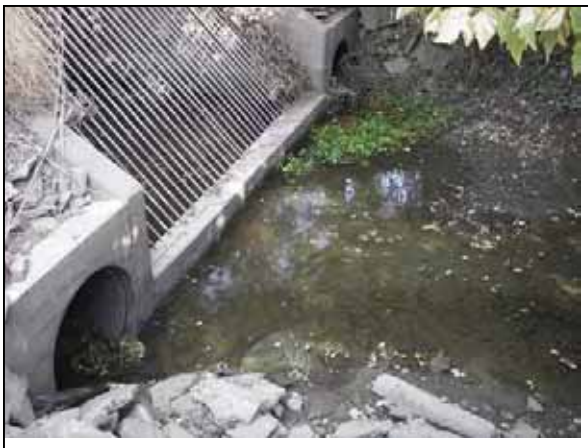
DO-61 Deadmans Slough
Sonde data is being collected at the outlet of DO-61 Deadmans Slough.

October 20, 2005

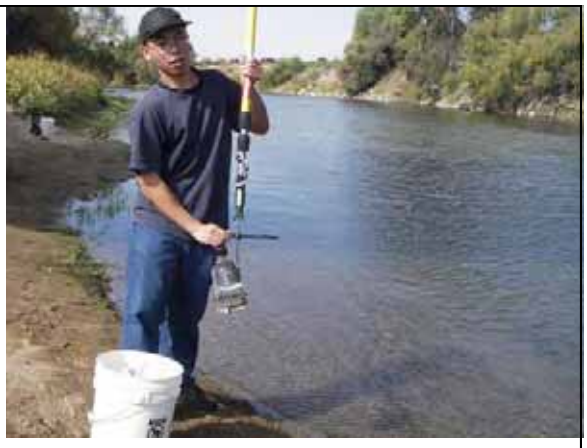
Core Sampling Event
Sampling for core sites. There was very little flow at Miller Lake because it was being drained.

DO-25 MID Miller Lake
Water being pumped out of Miller Lake.

DO-25 MID Miller Lake
Very low water level in Miller Lake.



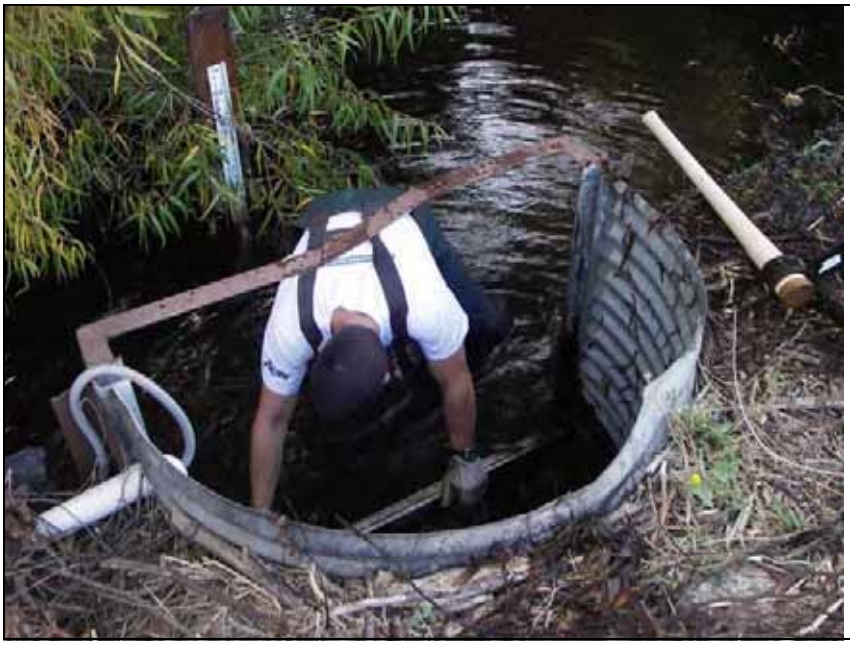
DO-25 MID Miller Lake
Photo showing very little flow under the levee from Miller Lake.



DO-14 Tuolumne River at Shiloh
Student Intern collecting water quality samples from the Tuolumne River.

October 25, 2005

Wetland Sampling Event
Sampling for wetland sites. Weir boards at DO-60 Moffit 1 South were cleared and the data was downloaded from the station.



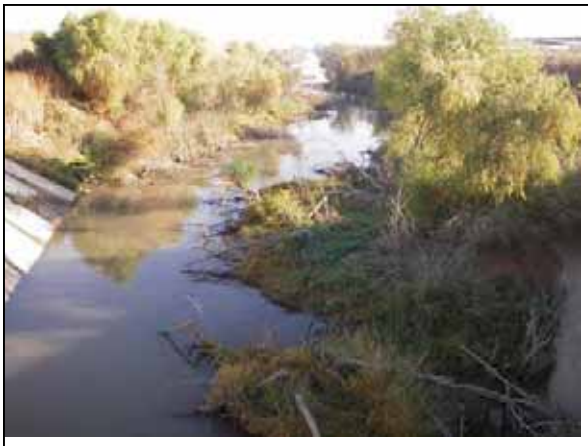
DO-60 Moffit 1 South
Jesse Merkel cleaning off the weir boards.

DO-62 Mallard Slough
Photo of what the beavers will do to a weir board if the top is not encased in a metal bracket.

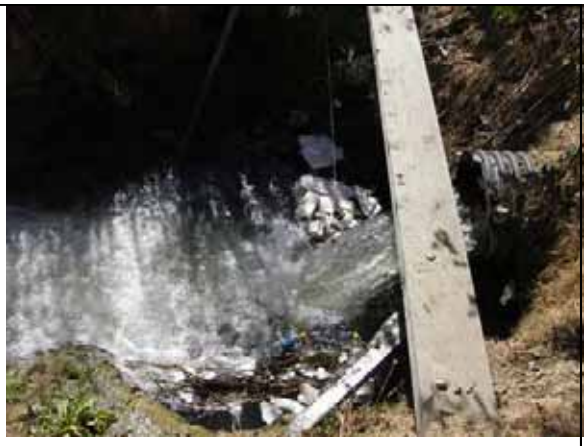
DO-60 Moffit 1 South
Metal brackets were added to the weir boards to prevent the beavers from chewing the boards.

October 27, 2005

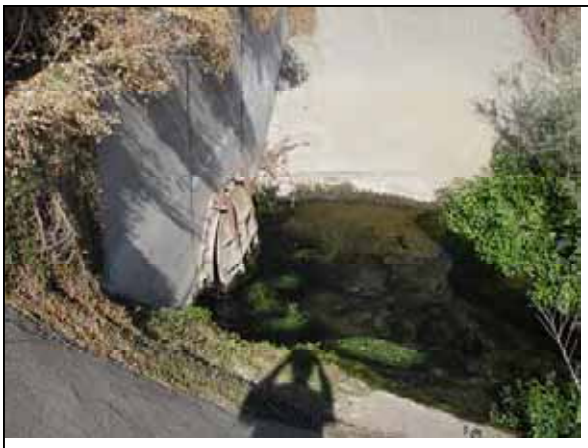
Intermittent Sampling Event
Sampling for Intermittent sites.



DO-67 Newman Wasteway at Brazo Road
Sample location along Newman Wasteway.



DO-35 Westley Wasteway
Outflow from the culvert under the road at Westley Wasteway.



DO-31 BCID New Jerusalem Drain
Outlet of New Jerusalem Drain before it goes into the San Joaquin River.

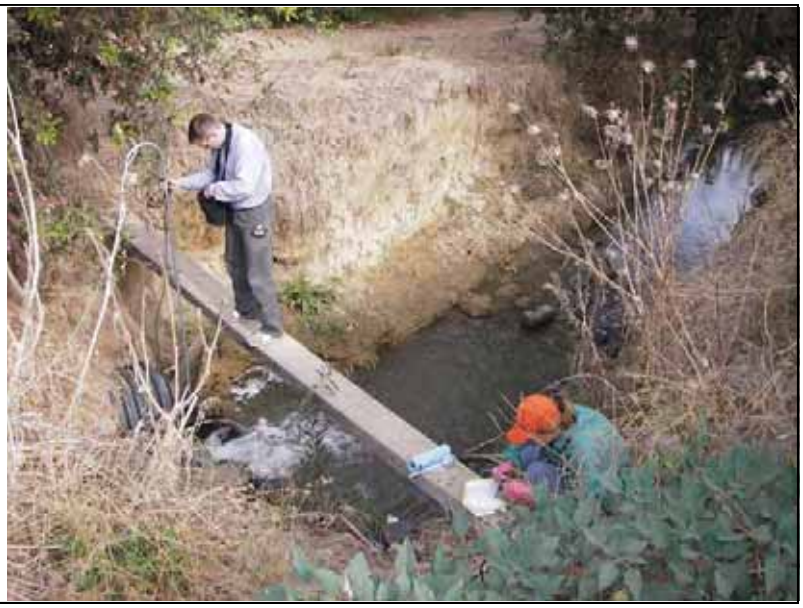
DO-66 El Solyo Water District Maze Drain
Sampling crew storing the gear before heading to the next sample site.

November 02, 2005

Westside Station Maintenance
Performed maintenance on Westside stations. Stations were visited for data downloads, cleaning, flow, EC, and temperature QA. Chris Linneman (Summers Engineering) installed concrete anchors for the bubbler pipe in Moran Drain.

DO-64 Moran Drain
Chris Linneman (Summers Engineering) drilling anchors into the concrete to stabilize bubbler pipe.

DO-36 Del Puerto Creek
Chris Linneman (Summers Engineering) performing a flow rating at Westley Wasteway while Liz Vonckx (Tetra Tech) cleans the EC probe.



November 08, 2005

Wetland Sampling Event
Sampling for wetland sites.

DO-63 Inlet C Canal
Samples are collected off of the walkway going over the Inlet C Canal.

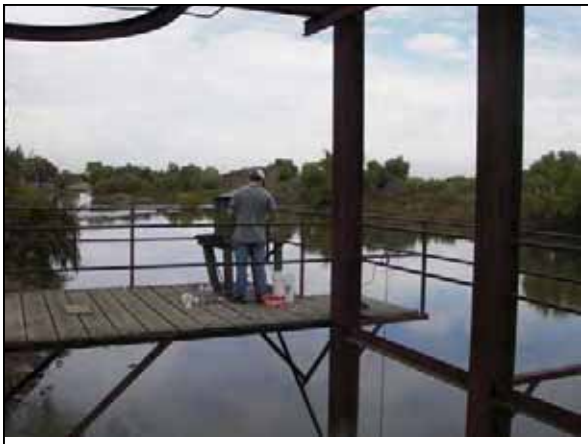
DO-60 Moffit 1 South
Flow station at DO-60 Moffit 1 South.

DO-80 Marsh 1 Inlet
Picture of the inlet to temporary Marsh 1. Flow into the wetland is controlled by a screw gate.

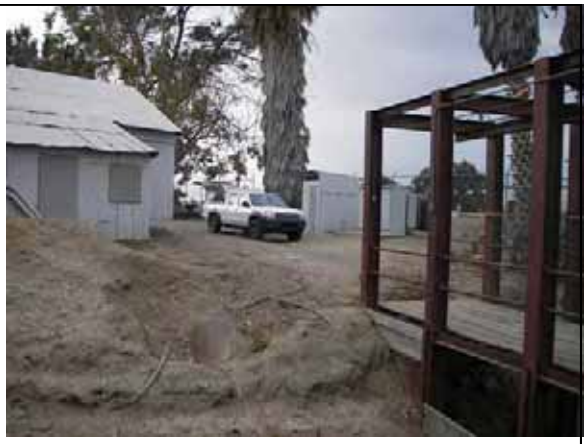
DO-53 Salt Slough at Wolfsen
Flow station at DO-53 Salt Slough at Wolfsen.

November 10, 2005

Core Sampling Event
Sampling for core sites. DO-25 Miller Lake was dry and no sample was collected.

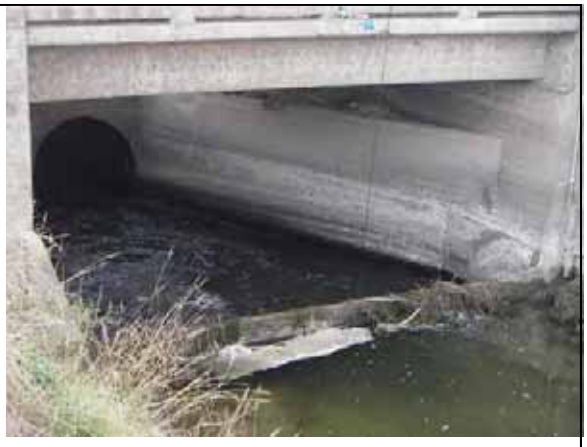


DO-07 SJR at Patterson
Student Intern collecting water quality samples from the pump platform.



DO-07 SJR at Patterson
Sample vehicle parked next to the pump platform at San Joaquin River at Patterson.

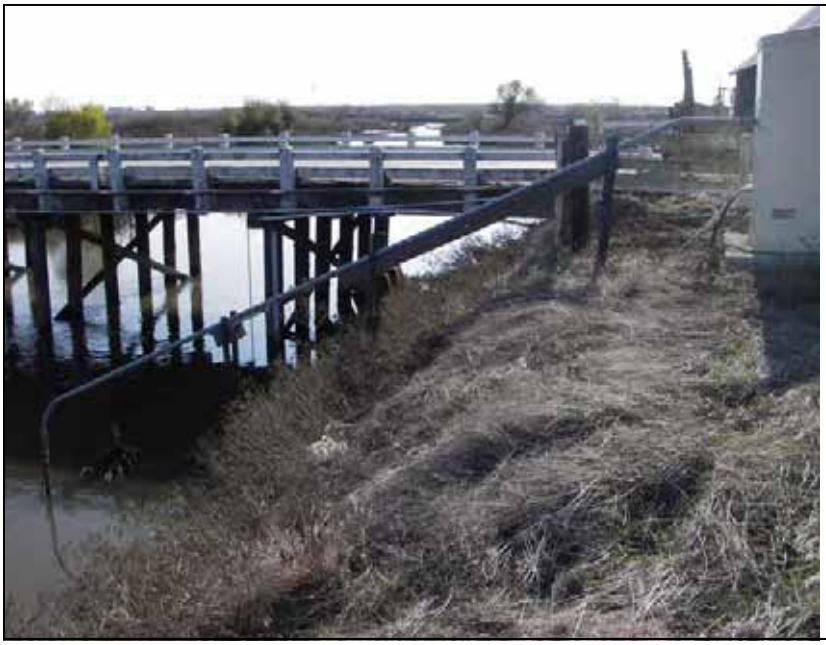
DO-29 TID Harding Drain
Student Intern is collecting a water quality sample using the bucket method.



DO-29 TID Harding Drain
Water is flowing through a hole in the middle of the weir structure instead of over the top.

November 29, 2005

Wetland Sampling Event
Sampling for wetland sites. DO-62 Mallard Slough was not sampled because the crew was locked out.



DO-53 Salt Slough at Wolfsen
Flow station on Salt Slough at Wolfsen.

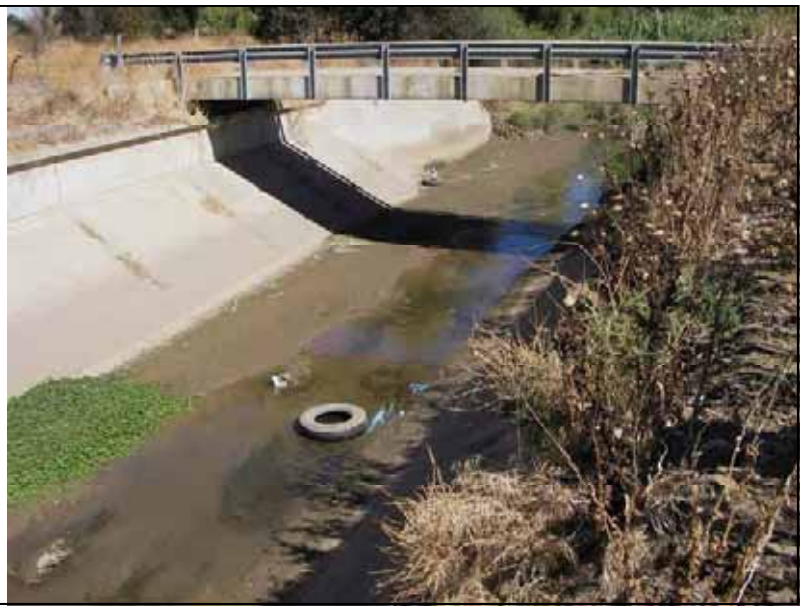
DO-63 Inlet C Canal
Photo showing DO-63 Inlet C Canal.

November 30, 2005

Westside Station Maintenance
Performed maintenance on Westside stations. DO-38 Marshall Drain, DO-64 Moran Drain, DO-65 Spanish Grant Drain, DO-57 Ramona Lake, DO-36 Del Puerto Creek, DO-35 Westley Wasteway, DO-34 Ingram Creek, DO-33 Hospital Creek, and DO-31 New Jerusalem Drain were visited for data downloads, cleaning, flow, EC, and temperature QA.

Three Drain Site
Flow station at the Three Drain site.

DO-35 Westley Wasteway
Photo showing Westley Wasteway just upstream of the flow station.

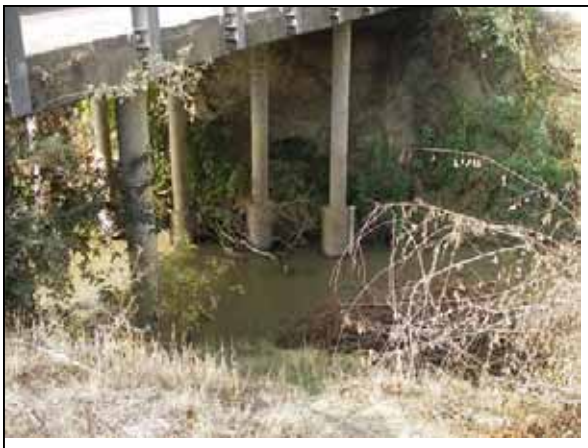


December 01, 2005

Core Sampling Event
Sampling for core sites.

DO-12 Stanislaus River at Caswell Park
Sample site along the Stanislaus River in Caswell Park.

DO-44 SLD End
Weir structure at the end of the San Luis Drain.



DO-21 Orestimba Creek
The sample location for Orestimba Creek is under the bridge next to the flow station.

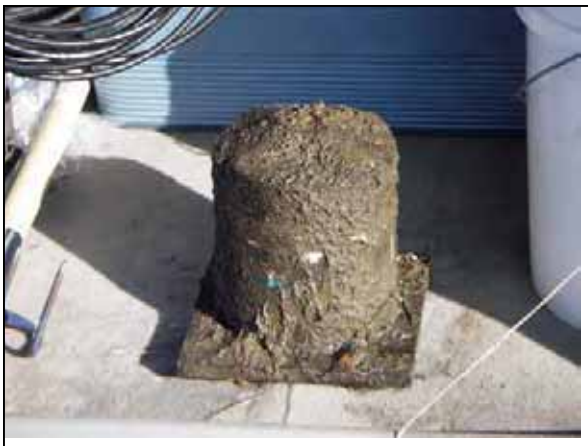
DO-07 SJR at Patterson
Photo of the San Joaquin River taken from the Patterson pump platform.

December 13, 2005

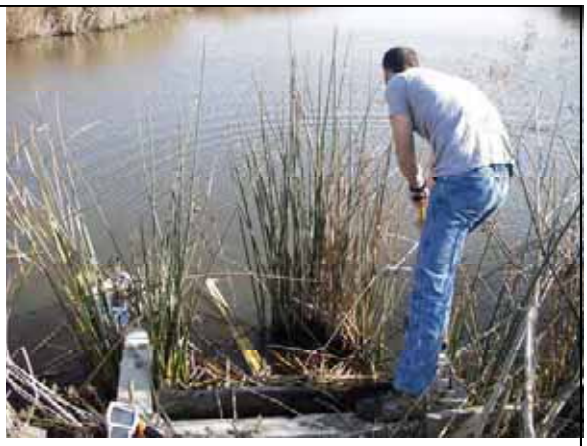
Wetland Sampling Event
Sampling for wetland sites.

DO-81 South Marsh 1 Outlet
Jesse Merkel is collecting a water sample from the temporary wetland.

DO-82 South Marsh 3 Inlet
The sonde is deployed in a float to prevent it from disturbing the sediments along the bottom of the sample site.



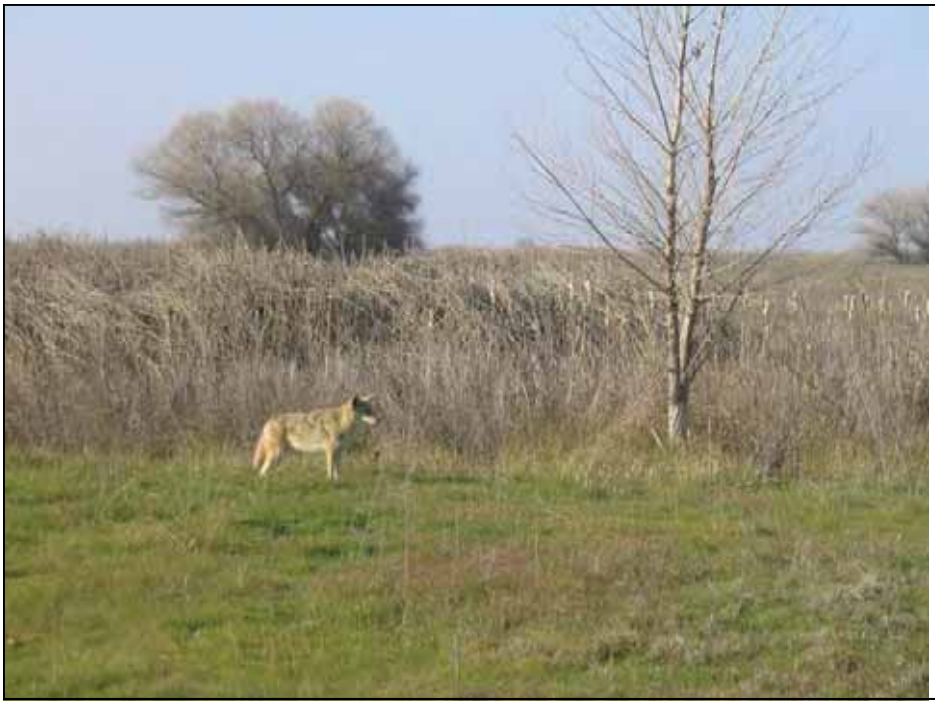
DO-53 Salt Slough at Wolfsen
Picture of the SonTek after being deployed in Salt Slough for a length of time.



DO-83 South Marsh 3 Outlet
Sample crew collecting sonde data and water quality samples from the outlet of the permanent wetland.

January 9, 2006

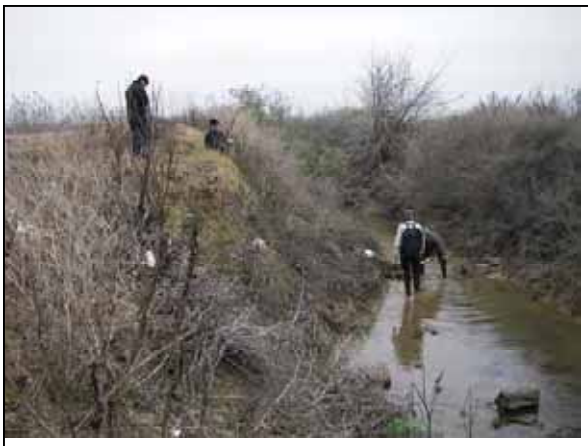
Grasslands Station Maintenance and QA
Met with Lara Sparks (Grasslands Water District/Department of Fish and Game) to assist her with stream ratings and equipment issues at the DO sites she manages within the Grasslands water district.
DO-20 Los Banos Creek Flow Station: Arrived to find old bridge completely washed out and dangling downstream from the instrument cables. Used rope and truck to pull bridge onto east bank of stream. Removed Sontek and pulled cable into pipe along with EC probe. Disconnected bubbler orifice and pulled pipe up onto shore. Brought Sontek unit in for cleaning and functionality check. Equipment was functional.
DO-68 S-Lake basin and Hollow tree Drain: S-Lake was at flood stage, boards for platform where the staff gauge was attached were floating. Hyacinth was 2+ft thick. EC probe was lifted out of water by Hyacinth. Keller Pressure Transducer in Hollowtree was non-functional. Measured length of cable for replacement sensor.
DO-46 MudSlough at Gun Club Rd.: Flood stage. Staff gauge was completely submerged by several inches.



Coyote in Wetland
Typical wildlife encountered during wetland trips.

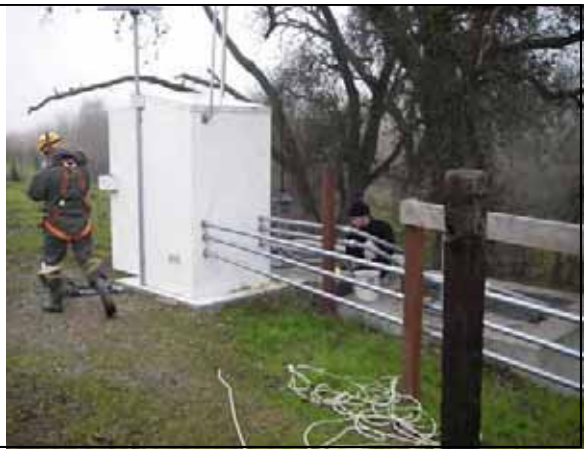
January 11, 2006

Westside Station Maintenance and QA
Met with Chris Linneman (Summers Engineering) and Kyle Kearney (Tetra Tech) at the 'three drains site' DO-38 Marshall Drain, DO-64 Moran Drain, and DO-65 Spanish Grant Drain for routine Westside station maintenance. In addition to the above sites, DO-36 DelPuerto Creek, DO-33 Hospital Creek, DO-35 Westley Wasteway, and DO-31 New Jerusalem Drain were visited for data downloads, cleaning, flow, EC, and temperature QA.



DO-34 Ingram Creek
(left) Student Intern, Kyle Kearney, Jeremy Hanlon, and Chris Linneman removing EC probe which had been encased in sediment. (right) Chris and Jeremy clearing away sediment buildup.

DO-38 Marshall Drain
Chris is preparing for his confined space entry to make flow measurements while Kyle cleans the YSI EC probe from the surface.



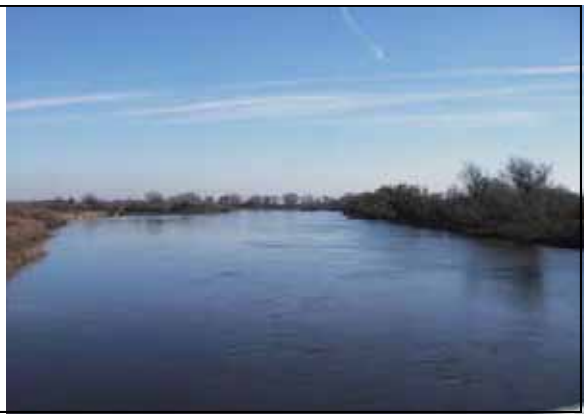
January 17, 2006

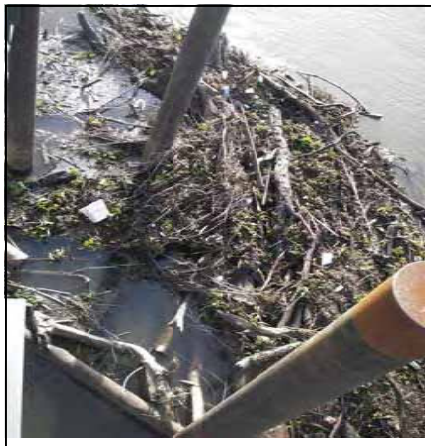
SLNWR Station Maintenance
Data downloads and station maintenance/QA performed at DO-60 Moffit, DO-61 Deadmans Slough, DO-62 Mallard Slough, and DO-63 Inlet C canal.

Ducks flying over refuge
Waterfowl were often seen flying around the refuge.

January 19, 2006

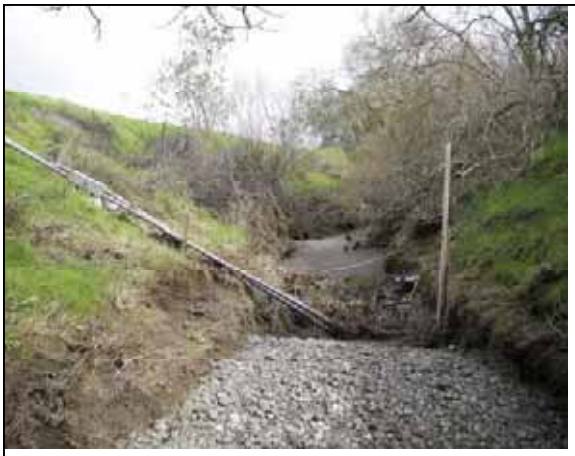
Core Sampling Event
Sampling for core sites. Picture taken from DO-05 SJR at Vernalis from the Department of Water Resources (DWR) McClune station platform looking north, shows San Joaquin River (SJR) swollen with runoff from recent rains.





DO-05 SJR at Vernalis
Debris caught on DWR platform pylons.

DO-28 TID Westport Drain Flow station
Newly Installed flume and SCADA monitoring system, about 300 ft downstream of the previous station location.

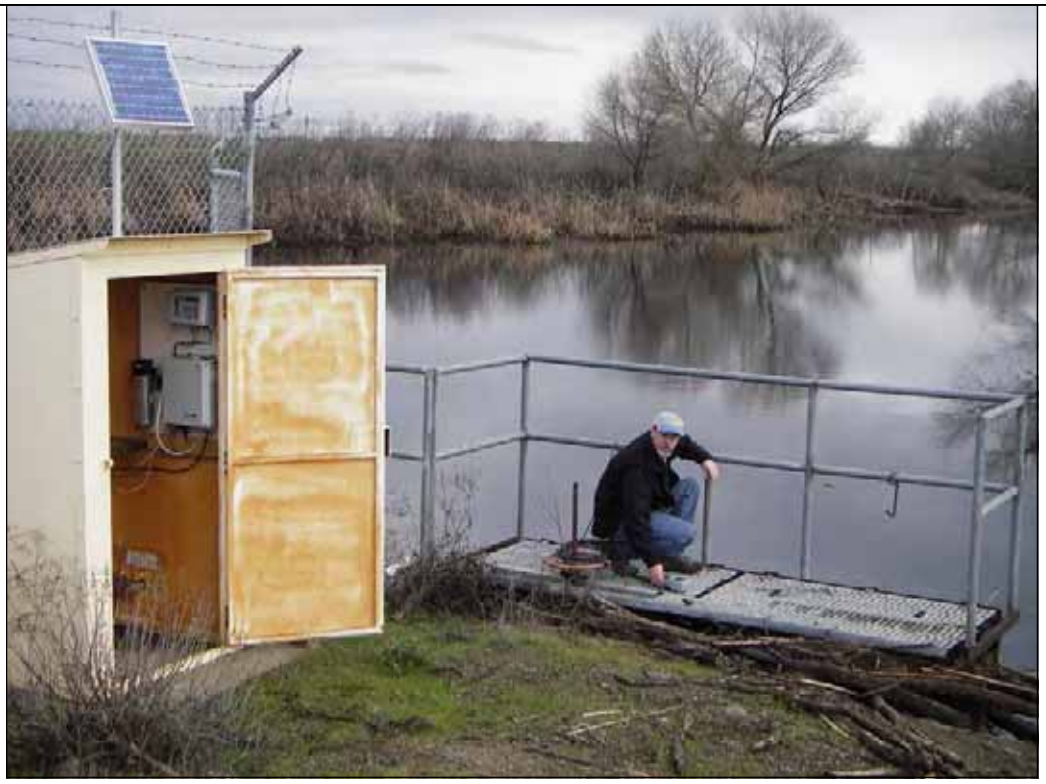


DO-36 Del Puerto Creek monitoring site
Streambed is dry despite recent rains and high levels in SJR.

DO-06 SJR at Maze Blvd.
El Solyo pump platform submerged under swollen SJR.

January 26, 2006

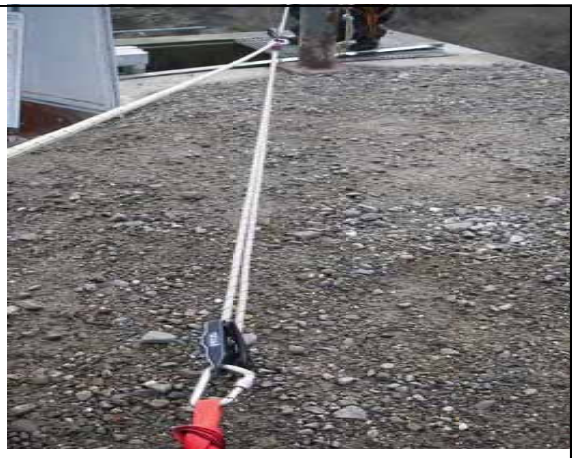
Wetlands Sampling Event
Sampling for wetland sites.



DO-61 Deadmans Slough
Picture taken at DO-61 Deadmans Slough in the San Luis National Wildlife Refuge. William Stringfellow is taking YSI sonde measurements. Additional measurements were taken throughout the wetlands sampling area.

January 31, 2006

Station Maintenance
DO-31 New Jerusalem Drain was visited in response to the discovery of a leaky bubbler line. The Swagelok fitting was removed and properly re-inserted, the connection was tightened, and checked for leaks. No leaks were found. The weir was rated for correlation to the bubbler reading. DO-34 Ingram Creek was visited to remove some of the sediment from behind the weirboard. The Sontek Doppler instrument at DO-53 Salt Slough at Wolfsen Road was re-installed because the mounting had been discovered to be completely rusted through the previous month. A new mount with stainless steel attachments was used. Met with Karl Stromayer of USFWS while at DO-53 to discuss upcoming training on station maintenance and QA procedures.

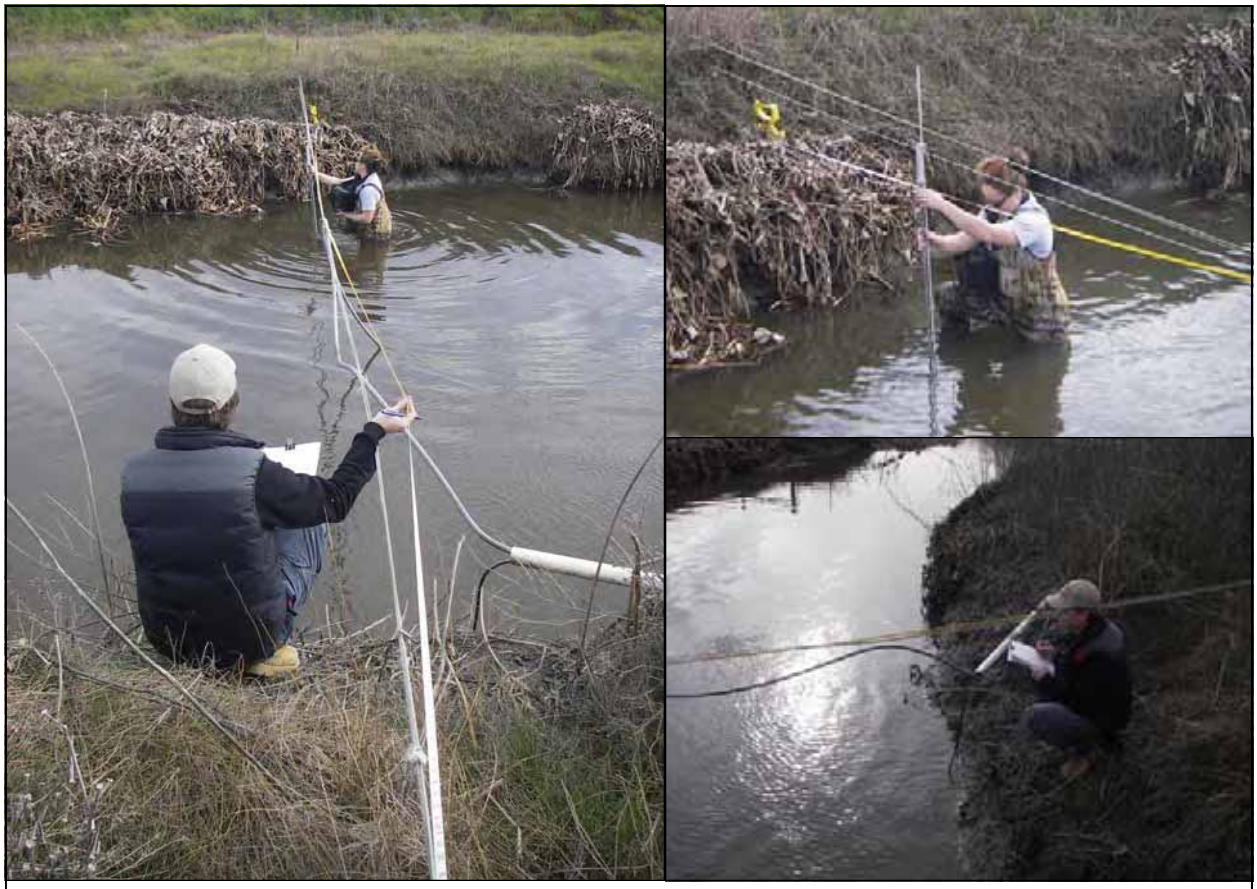


DO-31 New Jerusalem Drain
(left) Station house on top of levee with SJR behind. Ropes are rigged for lowering or belaying confined space entrant. (right) Rope system rigged for hauling up of confined space entrant.

DO-31 New Jerusalem Drain
Shows location of bubbler line orifice and YSI EC meter just upstream of weirboards. The unusually clear water here made the Starflow unable to read velocity and so it was removed and eventually upgraded to a MACE Agriflo unit that was placed downstream of the weirboards.

February 2, 2006

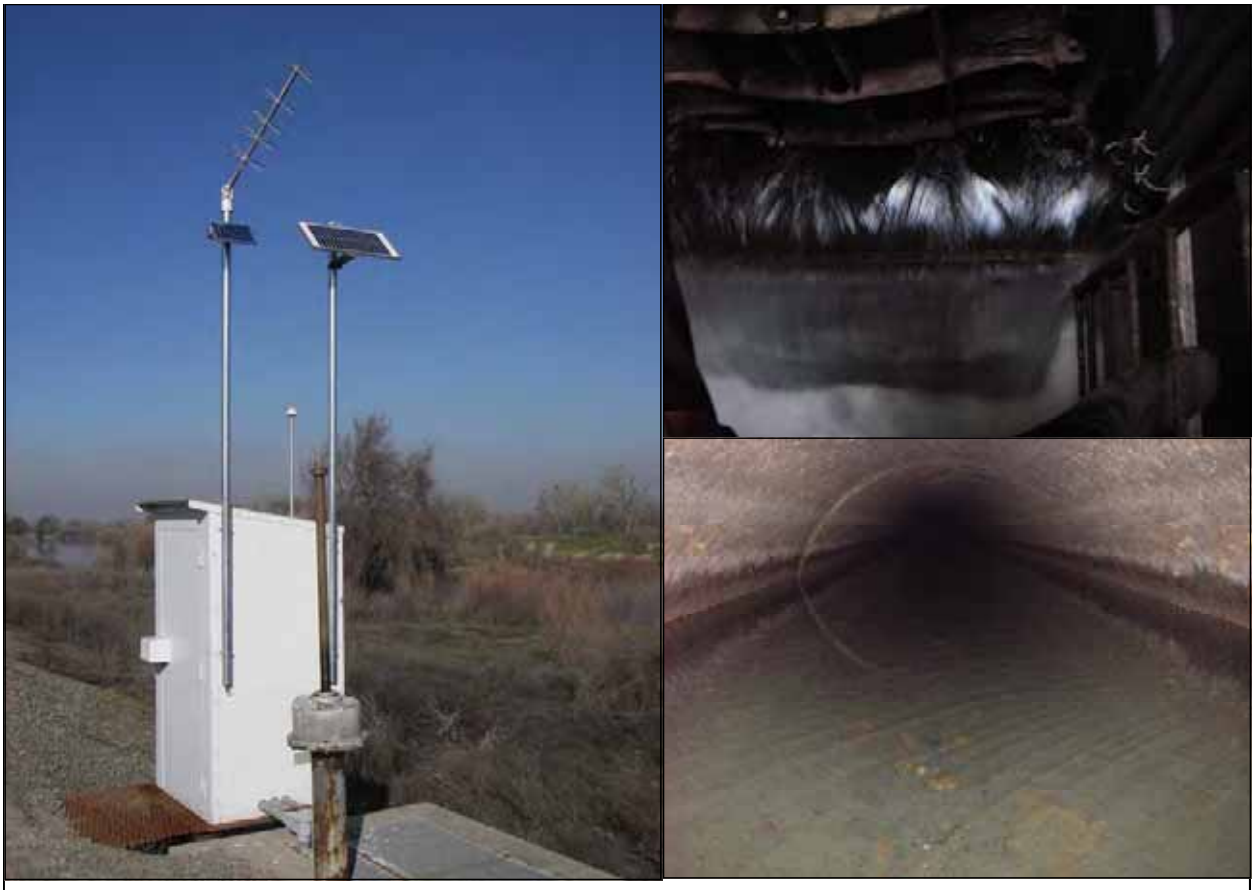
Grasslands Station Maintenance and QA
Met with Lara Sparks (Grasslands Water District/Department of Fish and Game) to assist her with stream ratings and QA at the DO sites she manages within the Grasslands water district. DO-45 Volta Wasteway Flow station staff gauge had been mounted to wood post that rotted away. The staff gauge was re-installed and anchored directly to a pole on the bridge with stainless steel clamps.



Stream Ratings
Pictures taken at DO-68 S-Lake Basin Monitoring site with Jeremy Hanlon and Lara Sparks performing a stream rating. Ratings were made at DO-68 S-Lake basin, Hollow tree Drain, DO-46 Mud Slough at Gun Club, and DO-45 Volta Wasteway Flow station.

February 8, 2006

Westside Station Maintenance
Accompanied Kyle Kearney (Tetra Tech) to Westside stations and performed flow measurements. Added weir board to DO-38 Marshal Road Drain, DO-64 Moran Drain, and DO-65 Spanish Drain. DO-35 Westley Wasteway Flow station DA logger was not communicating with YSI EC probe. Removed Logger for inspection and testing at UOP. At DO-57 Ramona Lake noted that the cable the YSI EC probe hung from was almost rusted out. Measured length for replacement.



DO-31 New Jerusalem Drain
Installed new MACE Agriflow Doppler flow meter. Note new smaller solar panel in picture (left) provides 6V power supply for Agriflo unit. Picture of water flowing over weir boards (top right) and picture looking upstream of pipe under levee (bottom right).

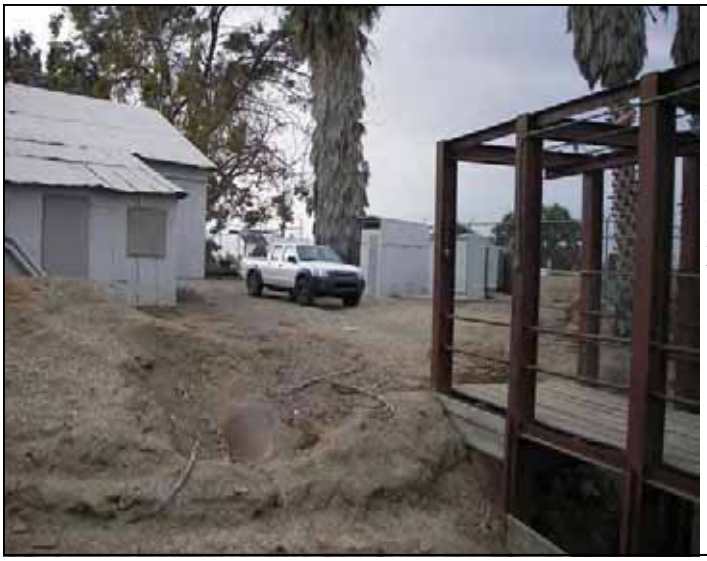
February 14, 2006

Westside Station Repairs
Returned to DO-31 New Jerusalem Drain to update Firmware on new MACE Agriflo unit so it would correctly output SDI-12 to the DA logger.
Returned to DO-35 Westley Wasteway Flow station to re-install DA logger after ensuring it was functioning properly with equipment at UOP. Found that the cable to the Starflow Doppler flow meter had been sliced open while a backhoe was clearing debris from the channel. Determined that the destroyed Starflow Doppler flow meter was causing a short circuit and making the logger freeze every time it tried to take a measurement. Disconnecting the cable solved the problem.

Starflow Doppler flow meter
Picture of Sontek Doppler flow meter with protective tubing around cord. The Starflow is put on the bottom of the channel to measure flow.

February 23, 2006

Core Sampling Event
Sampling for core sites. All sites were accessible and no problems were encountered.



DO-07 San Joaquin River at Patterson
Picture of Jeremy Hanlon's truck near the pump platform.

March 2, 2006

Wetland sampling event
Sampling for wetland sites. In addition to collecting grab samples, data was downloaded from the stations and QA measurements were taken. Beaver dams and other debris were cleared from weir boards where possible.

Beaver Activity
Picture of beaver dam at DO-60 Moffit 1 South. Debris and beaver activity clogged the weirs which often had to be cleared.

March 8, 2006

Westside Station Maintenance and QA
Accompanied Kyle Kearney (Tetra Tech) to provide support for safe entry into confined spaces. Took flow measurements. Added one 2x8 board to each of the three drains sites DO-38 Marshall Road Drain, DO-64 Moran Drain, and DO-65 Spanish Grant Drain. DO-34 Ingram creek, repositioned rocks in stream to help avoid siltation of EC probe.

DO-33 Hospital Creek
Close-up photo of installation showing bubbler pipe, EC meter in cage, and stream gauge all just upstream of weirboard.

DO-33 Hospital Creek
Student Intern in foreground with Kyle Kearney in station.